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THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME X

NEW YORK
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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā	as in ale, fate.
ā̇	“ “ senate, chaotic.
â	“ “ glare, care, and as *e* in there.
ă	“ “ am, at.
ä	“ “ arm, father.
ȧ	“ “ ant, and final *a* in America, armada, etc.
a	“ “ final, regal, pleasant.
a̤	“ “ all, fall.
ē	“ “ eve.
ē̇	“ “ elate, evade.
ĕ	“ “ end, pet.
ẽ	“ “ fern, her, and as *i* in sir, etc.
e	“ “ agency, judgment.
ī	“ “ ice, quiet.
ī̇	“ “ quiescent.
ĭ	“ “ ill, fit.
ō	“ “ old, sober.
ō̇	“ “ obey, sobriety.
ô	“ “ orb, nor.
ŏ	“ “ odd, forest, not.
o	“ “ atom, carol.
oi	“ “ oil, boil.
o͞o	“ “ food, fool, and as *u* in rude, rule.
ou	“ “ house, mouse.
ū	“ “ use, mule.
ū̇	“ “ unite.
ŭ	“ “ cut, but.
ṳ	“ “ full, put, or as *oo* in foot, book.
û	“ “ urn, burn.
y	“ “ yet, yield.
B	“ “ Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch	as in chair, cheese.
D	“ “ Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g	“ “ go, get.
G	“ “ German Landtag = *ch* in Ger. ach, etc.
H	“ *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw	“ *wh* in which.
K	“ *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̲	“ in sinker, longer.
ng	“ “ sing, long.
N	“ “ French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh	“ “ shine, shut.
th	“ “ thrust, thin.
TH	“ “ then, this.
zh	“ *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz''m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

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* Deceased.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

GLACIAL (glā′sh*a*l) **DRIFT.** See Drift.

GLACIAL PERIOD, PLEISTOCENE (plīs′tō-sēn) **PERIOD,** or **ICE AGE.** A division of geologic time, comprising the earliest part of the Quaternary period. The term gains its significance from a remarkable episode in which abnormal conditions of climate were involved. In late Tertiary times there seems to have been a gradual lowering of temperatures throughout the north temperate zone, and this change progressed steadily until at the opening of the Glacial period the climate was essentially arctic. Within the continental areas enormous glaciers and ice sheets then formed, which advanced southward, filling the river and lake basins, covering the mountains, and burying the lowlands beneath a vast *mer de glace.* One field of ice extended over Canada and the northeastern part of the United States. Its northern limits have not yet been defined, but on the east it reached the Atlantic Ocean, and southward it advanced well into New Jersey, Pennsylvania, and the States between the Ohio and Missouri rivers. New England, New York, and the region of the Great Lakes were completely covered by the ice sheet. In the White Mountains the rocks bear evidence of having been striated and polished almost to the summits of the highest elevations, and the same phenomena have been recorded for the Adirondacks and Catskills, showing that the ice in places was several thousand feet thick. The mountains of western North America were also the scenes of great glacial activity, of which the snow fields of the present day are but wasted relics. Glaciers descended from the Rocky Mountains of Colorado and from the Sierra Nevadas of California far into the river valleys, while those of Alaska and British Columbia were so extensive as to form practically a single field.

The change in temperature seems to have been no less marked in the Old than in the New World. An ice sheet covered the whole of northern Europe; it filled up the basin of the Baltic on its way from Scandinavia to the plains of north Germany, and it crossed the North Sea to the Scottish Highlands, whence it moved northward and westward into the Atlantic. The whole of England north of the Thames, as well as Scotland and Ireland, was buried beneath the ice, which attained a thickness in some localities of 5000 feet. On the Continent the sheet spread over Scandinavia, Denmark, Holland, and parts of Germany, Belgium, and Russia, and comprised an area of about 800,000 square miles, or several times larger than the Greenland ice cap. South of its limits there were smaller snow fields and glaciers in the Carpathians, Alps, Jura, Pyrenees, and the Central Plateau of France. The present Alpine glaciers are shrunken remnants of the field that covered Switzerland during this period. The high mountain systems of Asia also show evidence of having been glaciated. In the Southern Hemisphere the glaciers of Patagonia were once enlarged so as to extend across the peninsula to the Atlantic shores, and New Zealand was overrun by the ice; but it has not been definitely established that the period of glaciation here was contemporaneous with that of the Northern Hemisphere.

Effects of Glaciation. The general configuration of continental lands has not changed appreciably since the opening of the Glacial period. The mountain systems had acquired their elevation before that time, and in a general way the drainage was directed towards the same channels that now carry the surface waters seaward. The ice exerted a powerful influence, however, upon minor land forms or types of scenery. In its progress from north to south and from highland to lowland it pushed along the soil and disintegrated rock, the accumulations of long periods of subaërial decay, and deposited them in great moraines, which still give a peculiar aspect to the scenery of glaciated regions. At the same time the sand and stones incorporated in the mass of moving ice were efficient agents of erosion; rock surfaces, wherever exposed, were smoothed and striated, prominences assumed a more rounded form, and the valleys were widened and deepened. The rock striations show that the direction of flow was influenced by mountain ranges of considerable elevation, although small inequalities in the surface caused no deviation. Most of the lakes in northern Europe and America had their origin in this period. Lake basins were scooped out by erosion, and temporary lakes were formed by obstruction of valleys during the retreat of the ice sheet. One of the largest temporary basins, which has been surveyed by means of the old beach lines, extended from the northern parts of Minnesota and North Dakota far into Canada, and covered an area exceeding that of all the Great Lakes combined. All lakes which are of preglacial origin show evidence of having been expanded during this period. The Great Lakes are bordered by a succession of terraces, the highest of which stand nearly 500 feet above the present water level. The ice sheet for a time stretched across the St. Lawrence valley, turning the drainage of Lake Ontario into the Mohawk and Hudson; and Lake Michigan, obstructed at its outlet, overflowed towards the southwest into the Illinois River.

A further important result wrought during the Glacial period was the removal of the soil that had been derived in situ by weathering and the substitution of a covering of "drift" (q.v.). This glacial material was spread very unevenly over the land. In the Laurentian highlands of Canada, where the ice sheet formed, the surface is bare rock or at most thinly covered with soil. Farther south the drift accumulated along lines marking the advance and retreat of the ice in great heaps of bowlders, gravel, sand, and clay. Such terminal moraines are strongly developed in New England, New York, Ohio, and the Northern States as far west as Kansas. A second portion of the transported material was distributed beneath the ice sheet as "bowlder clay" (see BOULDER CLAY) or "till," in the form of a ground moraine. The bowlder clay is a compact, tenacious clay containing bowlders of varying size and generally unstratified, although traces of bedding are sometimes present. It rests directly upon the rock, which is usually smooth and striated. The bowlder clay is distributed unevenly, gathering into smoothly arched ridges and mounds called "eskers" and "drumlins" (qq.v.), and at times thinning out so as to leave the rock formations exposed.

The extraordinary changes of climate indicated by the Glacial period led to migrations of the fauna and flora inhabiting the Arctic and temperate zones. As the temperature fell, such animals as were unable to endure extreme cold worked southward, while some species found their way from the far north into regions from which they have long since disappeared; remains of the polar bear, reindeer, and Arctic fox occur in the glacial deposits of southern Europe. With the retreat of the ice the Arctic fauna and flora were able to adjust themselves to the changing conditions by withdrawing from southern latitudes or by ascending the slopes of mountains. The oscillation of the climate was thus accompanied by a variation of the life forms in each particular region.

Divisions of the Glacial Period. A detailed study of the glacial deposits shows that they were not laid down continuously or under uniform conditions. On the other hand, the deposits are frequently divided into sections by intercalated beds of peat, and by variations in the relative degree of weathering which lead to the assumption that the ice advanced and retreated more than once. The evidences as to the number and extent of such fluctuations have not, as yet, been correlated successfully for different regions, and there is still much difference of opinion on the subject. The glacial deposits of the interior of North America are divided, according to the more recent views of geologists, into four and possibly six stages, each of which represents a period of glacial advance, with intervals of ice recession between each member. The stages are not all present in any one place, and they probably denote widely variant periods of time, the earlier being the longer. Beginning with the oldest, they are: (1) Jerseyan, (2) Kansan, (3) Illinoian, (4) Wisconsin. The presence of two other stages—the one (Iowan) preceding and the other (Later Wisconsin) following the Wisconsin—is advocated by some authorities.

Estimates of Time. The Glacial invasion was the last important geological event preceding the present epoch that exerted a wide influence upon the physical features of the earth. Just how long ago it occurred cannot be stated, but estimates based on different data seem to indicate that the ice retreated from the northern United States at least 25,000 years ago. The time diminishes, of course, with increasing latitude and in Sweden it is calculated that the ice extended over the southern part as late as 12,000 years ago. The duration of the entire period from the first advance of the ice could not have been much less than 500,000 years and may have been two or three times that figure. It is certain that man existed during the later stages.

Causes of Glacial Climate. Various theories have been proposed to account for the cold climate of the Glacial period. A sufficient cause may be found in terrestrial changes, such, e.g., as would lead to a variation in the distribution of land and water. The formation of glaciers is influenced by precipitation and thus by the proximity of warm waters to areas of cold land. It is conceivable that the poles may have been surrounded by a large land area which would exert a cooling effect upon the climate, and that the flow of ocean currents may have been so directed as to increase precipitation, but such a view is unsupported by geological evidence. A second theory, based upon terrestrial changes, ascribes the cold climate to a general elevation of the land surface in the north temperate zone, possibly accompanied by a diversion of the Gulf Stream across the present Isthmus of Central America into the Pacific. This theory fails in the same particular as the first, i.e., there are no evidences of such great vicissitudes. While either of these theories would account for the cold, it is also difficult to bring them into consonance with the view now commonly accepted by geologists, that the Glacial period was marked by periodical variations in the climate. One of the most ingenious explanations that have yet been proposed is based upon the relative positions of the earth and sun at distant periods of time. It is known that the eccentricity of the earth's orbit is subject to secular variations. With a maximum of eccentricity the earth is 14,000,000 miles nearer the sun during perihelion than in aphelion, and the difference in the amount of direct heat received from the sun between these positions is about one-fifth. If now, by precession of the equinoxes, winter in the Northern Hemisphere should occur when the earth is in aphelion, the effect would be to lengthen this season by 22 days and to shorten the summer by an equal period. This coincidence of maximum eccentricity with aphelion winter would perhaps result in the refrigeration of the climate in the Northern Hemisphere. This theory, developed by Dr. James Croll, gained considerable favor for a time, but like the other theories is not without its defects. The most serious objection to its application is that it apparently limits the duration of the glacial stage to the precessional period of

21,000 years, altogether too brief for the results accomplished by the ice. More recently the trend of opinion has rather favored the influence of atmospheric agencies, such as those of the winds, the relative variations of moisture and of carbonic-acid gas in the air. No single explanation yet advanced seems to meet all the conditions of the problem, and it appears quite probable that the real cause of the Glacial period may lie in a concurrence of several different factors.

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GLACIER, glā′shẽr *or* glăs′ĭ-ẽr (Fr., from *glace*, Lat. *glacies*, ice). Many valleys of the Alps and of other high mountain ranges are filled with ice which extends from the snow fields above to well below the tree line. This mass of ice is called a glacier. The winter's snow, falling on the lower part of the glacier, melts away the following summer and exposes the ice, which also melts to some extent, and which, if there were not some source of supply, would entirely disappear. In the snow fields above, the annual snowfall is not all melted in summer, and there is an accumulation of snow. It is evident that in time the snow would grow indefinitely high if there were no means of relief. The necessary relief is found in the flow of the ice, which carries off the surplus snowfall of the snow fields, consolidated into ice, to the lower part of the glacier. A glacier, therefore, has two distinct parts—a *reservoir*, where the snow is collected, and a *dissipator*, where the ice is melted. The line separating these two regions is usually called the *névé* line. We are thus led to the following definition: A glacier is a body of ice and snow formed in a region where the snowfall is greater than the waste, and flowing to a region where the waste is greater than the snowfall.

Distribution. Whenever there is an annual snowfall greater than the annual waste, glaciers must exist. We find them on all high mountains subject to moist winds, such as those on the western coast of North and South America, the Scandinavian mountains, the Alps, the Pyrenees, the Caucasus, the Himalayas, and the mountain chains to the north, and the New Zealand Alps. One glacier is known in Mexico, on Mount Iztaccihuatl, and a number in equatorial Africa, on Mount Kenia, on Mount Kilimanjaro, and on the Ruwenzori Range. In the Arctic regions Grinnell Land, Greenland, Iceland, Jan Mayen Land, Spitzbergen, and Franz Josef Land are more or less covered with glacial ice; and the Antarctic lands are almost entirely ice-covered.

Classification. Glaciers may be divided into the following classes:

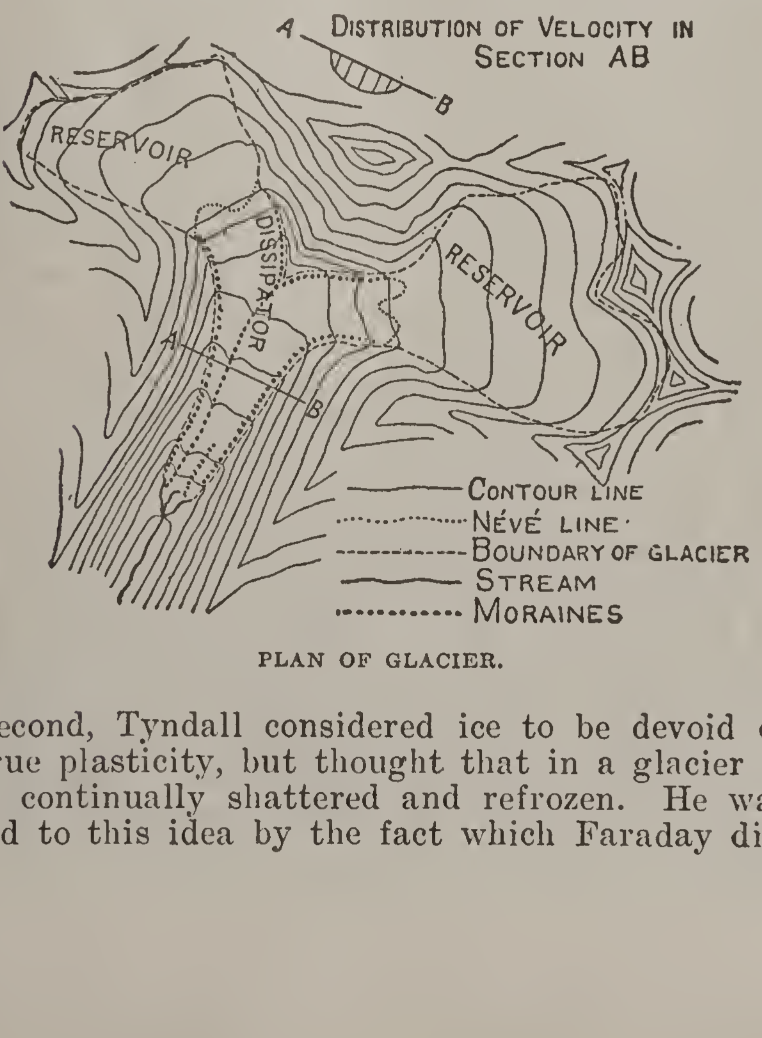
1. Continental glaciers, or inland ice, such as the great masses of ice that cover Greenland and the Antarctic Continent. 2. Plateau glaciers, or local ice caps, similar to continental glaciers, but of comparatively small extent. Examples of this class are found in Norway, in Spitzbergen, and on the borders of Greenland. 3. Alpine glaciers, the more familiar forms, which occupy valleys. 4. Piedmont glaciers. This form occurs when Alpine glaciers debouch and spread out on a plain. The best example is the Malaspina Glacier, at the foot of the St. Elias Alps in Alaska. 5. Hanging glaciers, which rest on shelves on the mountain side. They are usually small and steep. 6. Débris glaciers (*glaciers remaniés* of the French), formed not from snow, but from ice falling from a higher glacier. They are usually small and unimportant.

Glaciers may be complete or incomplete. A complete glacier has a reservoir where the snow is accumulated and a dissipator where the ice is all melted; an incomplete glacier either has its ice supplied directly, as in class 6, or loses some of its ice at the lower end by breakage, as in glaciers which break off at a cliff, or those which reach the sea and form icebergs.

Motion. If a glacier is in equilibrium—i.e., neither growing larger nor smaller—the ice annually flowing through any cross section of the glacier must exactly equal the total annual accumulation above and the waste below that section. As the accumulation above and the waste below a section through the névé line is greater than for any other section, the flow, under uniform conditions, is the greatest there; and it is less and less through sections more and more distant from the névé line, whether they are higher in the reservoir or lower in the dissipator.

That the ice of glaciers is in motion down the valley has long been known, both from the observation that large stones are carried down on the surface of the ice and from the general reasoning given above. It was not, however, until Agassiz and Forbes began their classical researches that any quantitative value of the motion of the ice was obtained. Since then many measurements have been made on various glaciers, and we now have a fair knowledge of this matter. It has been found that at any section the velocity of the ice is greatest at the centre and diminishes as we approach the sides. When, however, a glacier has a sinuous course, the greatest velocity is not in the exact centre, but is displaced towards the convex side, so that the line of maximum velocity is more sinuous than the glacier itself. The velocity diminishes also from the surface of the ice towards the bed of the glacier. The observations on which this statement rests are neither numerous nor satisfying; nevertheless, they are sufficient to establish the fact. It will appear that, as Forbes said, the flow of a glacier is very much like that of a river; if we consider a river which is flowing into a sandy region, where the water is gradually lost by seepage, the analogy is still more striking. In valley glaciers of fairly uniform slope the velocity is greatest at the névé line and diminishes as we ascend or descend from there. This law is subject to many exceptions; if the valley contracts in descending, there must be an increase in velocity; if the slope of the valley increases, this will also increase the velocity; in glaciers which reach the sea and break off in bergs the velocity increases as we approach the end, as a result of the lack of support in front. There is also a slight movement into the glacier in the reservoir, which is greatest where the accumulation is greatest, and one towards the surface in the dissipator, which is greatest where the waste is greatest. As to actual values in velocities, we find that the Mer de Glace has the greatest velocity of all glaciers in the Alps, its maximum amounting to 35½ inches a day. The greatest velocity of the Aletsch, the largest glacier of the Alps, is 20 inches a day. For other Alpine glaciers we find various velocities down to an inch or two a day, or even less for the smaller ones. Of larger glaciers, the Muir in Alaska has a velocity of about 7 feet, near where it reaches tidewater; and one of the larger ice streams of Greenland, the Upernivik, was found to have a velocity of 99 feet a day at one point near its end.

Cause of Glacial Motion. Many theories have been advanced to explain why the ice of glaciers, which is apparently so very brittle, should flow like a plastic substance. There are two questions to be answered, viz., What is the force causing the ice to move, and what property of ice enables it to move as it does? There is a general unanimity at present in the belief that the weight of the ice itself is the only force causing the motion, but there is not so much unanimity in answering the second question. Three explanations still hold their ground: First, according to Forbes and Rendu, the ice, in spite of the fact that it is very brittle to any rapid change of shape, is truly plastic to slow changes; just as shoemaker's wax will break under a sharp blow, but will allow a bullet by its own weight to sink slowly through it. This has been abundantly proved by the experiments of Pfaff, Andrews, Main, McConnell, and Kidd. Experiments on single ice crystal show that the crystal is plastic in planes at right angles to the optic axis. This is the *plastic* or *viscous* theory.



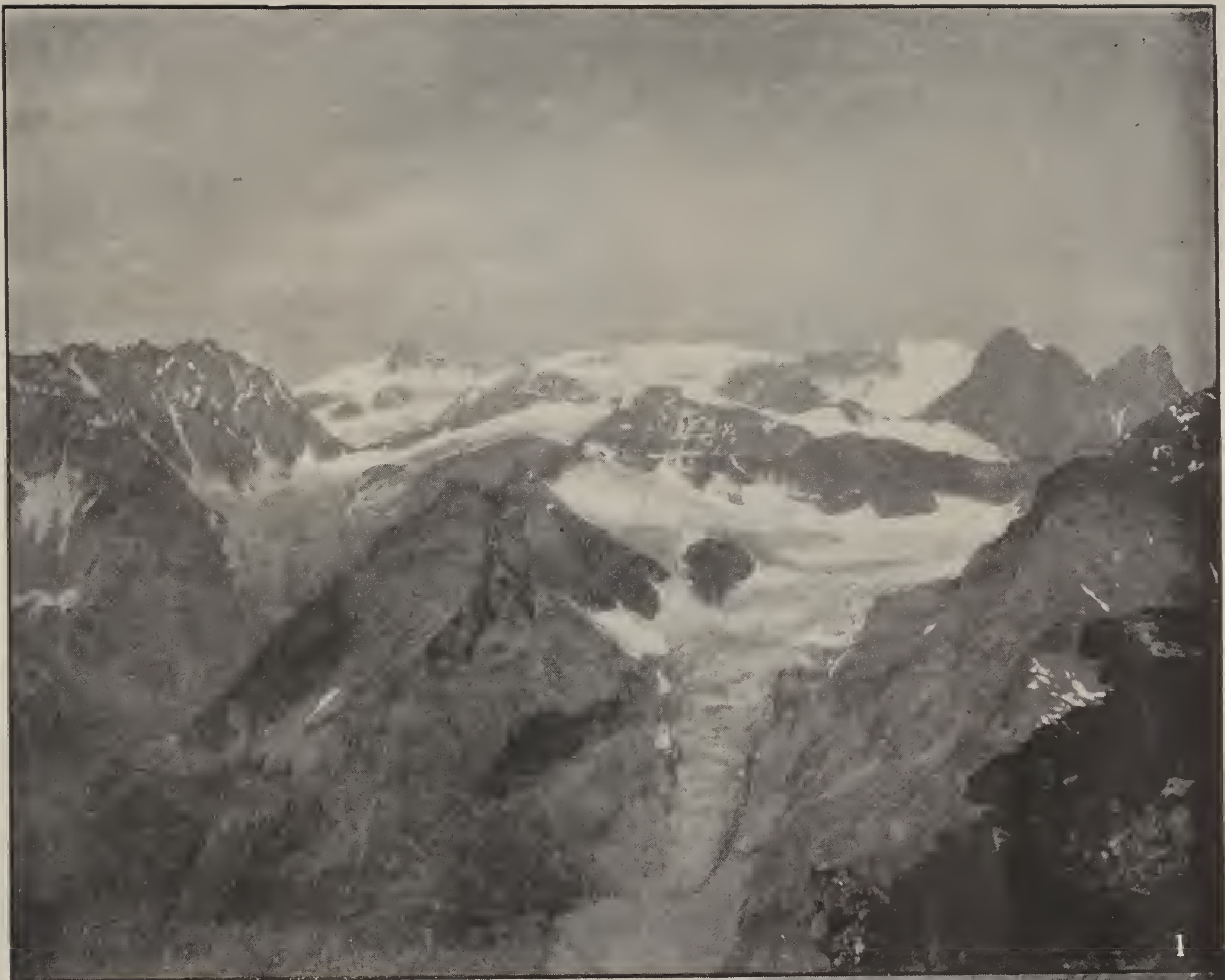
PLAN OF GLACIER.

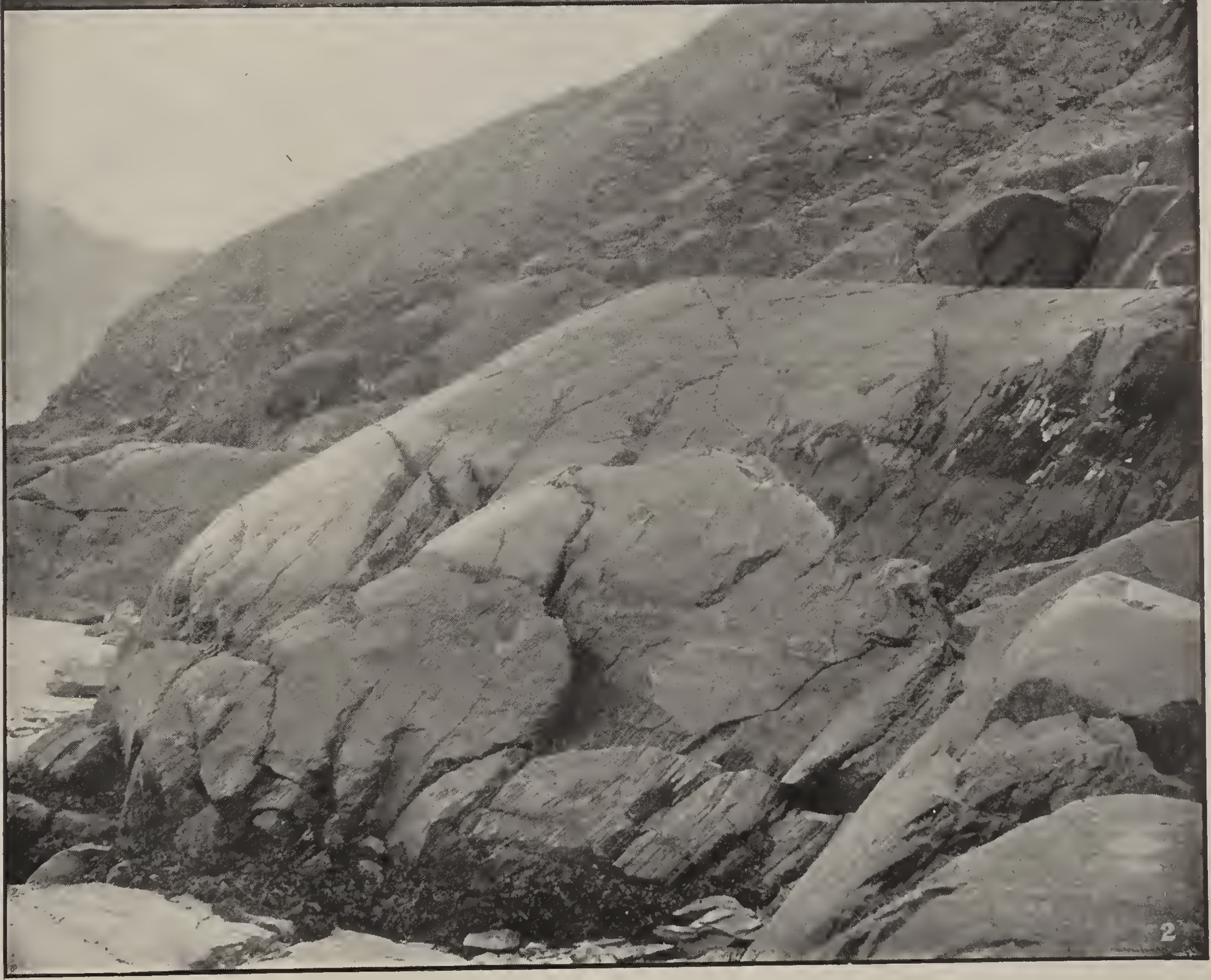
Second, Tyndall considered ice to be devoid of true plasticity, but thought that in a glacier it is continually shattered and refrozen. He was led to this idea by the fact which Faraday discovered, that two pieces of ice when brought into contact will freeze together. He showed by many experiments that ice could be crushed and forced through curved tubes and come out clear ice, the fragments having entirely coalesced. This is the *fracture* and *regelation* theory. Third, James Thomson discovered that the freezing point of ice is lowered .0075° C. from an increase of one atmosphere of pressure, and applied this fact to the explanation of glacial motion. He supposed that at any point where, by the movement of the ice, the pressure becomes a little greater than the average, the freezing point will be lowered and a small amount of ice melted; the pressure being thus relieved, the ice will move slightly, and the pressure will be transferred to other points; the water thus formed will be squeezed through crevices in the ice to other points where the pressure is less, and will there freeze. A continuation of this process will result in the general progression of the ice down its valley. This is the *pressure* and *regelation* theory.

Crevasses. Although the ice of glaciers can suffer some distortion without breaking, if the rate of distortion is too great the ice will crack and great crevasses form. Crevasses can be divided into distinct classes: *Marginal* crevasses, which occur on the sides of glaciers and point upstream at an angle of about 45°; they are the result of increasing velocity from the sides to the centre of the glacier. There must also be a tendency to the formation of crevasses at the bottom of the glacier pointing upstream, but it is extremely probable that the weight of the ice is sufficient to prevent their forming except occasionally very near the end of the glacier. *Transverse* crevasses are formed when the slope of the bed increases. *Longitudinal* crevasses form near the end of the glacier, especially when the ice spreads out on a plain; they are due to the pressure of the ice behind and are usually arranged radially. Irregular crevasses may be formed as the result of some irregularity in the bed of the glacier. There is usually a very large crevasse, called the *bergschrund*, at the upper margin of the reservoir; it is due to the more rapid motion of ice of the reservoir pulling it away from the ice clinging to the mountain slopes. In the dissipator the crevasses are in full view, but in the reservoir they are frequently covered with snow; this makes traveling above the snow line very dangerous, except for parties of several persons properly roped together. When crevasses first form they are mere cracks, which afterward widen out as the result of the motion of the ice and the melting of their sides, until they sometimes are 50 or even 100 feet wide. They may be half a mile or more in length, but the great depths which they are supposed to reach are exaggerated; they are rarely so much as 200 feet deep, and probably never as deep as 300 feet.

Moraines. The rocks and débris which fall upon the surface of the glacier and are carried down by it, and the material pushed along under the ice, are called *moraines*. They cannot be seen in the reservoir, as they are there covered by the snow, but they are very striking features of the dissipator. *Lateral* moraines are formed by the rocks falling from the mountains upon the sides of the glacier. When two tributary glaciers unite to form a trunk glacier, two of the lateral moraines unite to form a *medial* moraine, which from a distance looks like a great dark

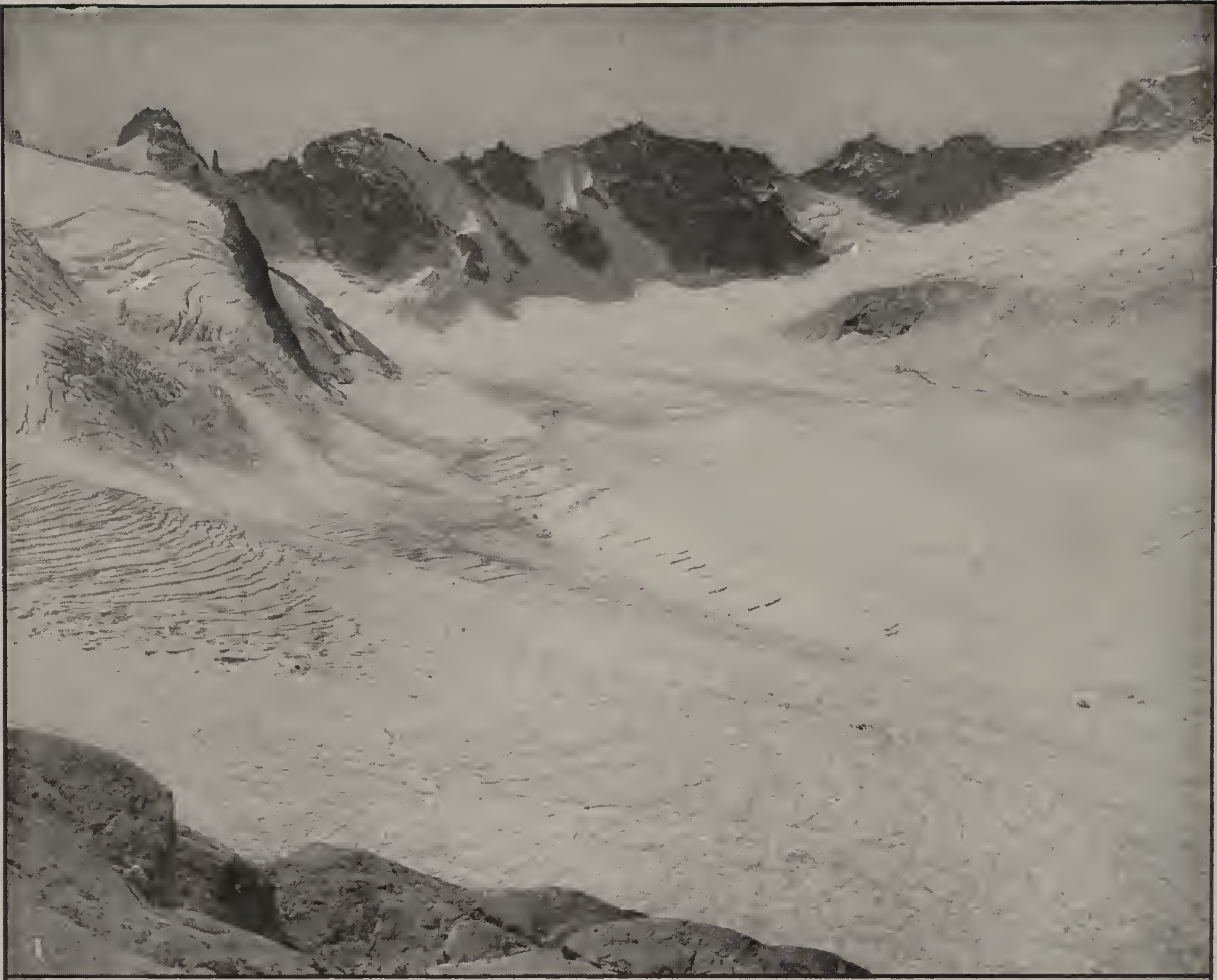
GLACIERS

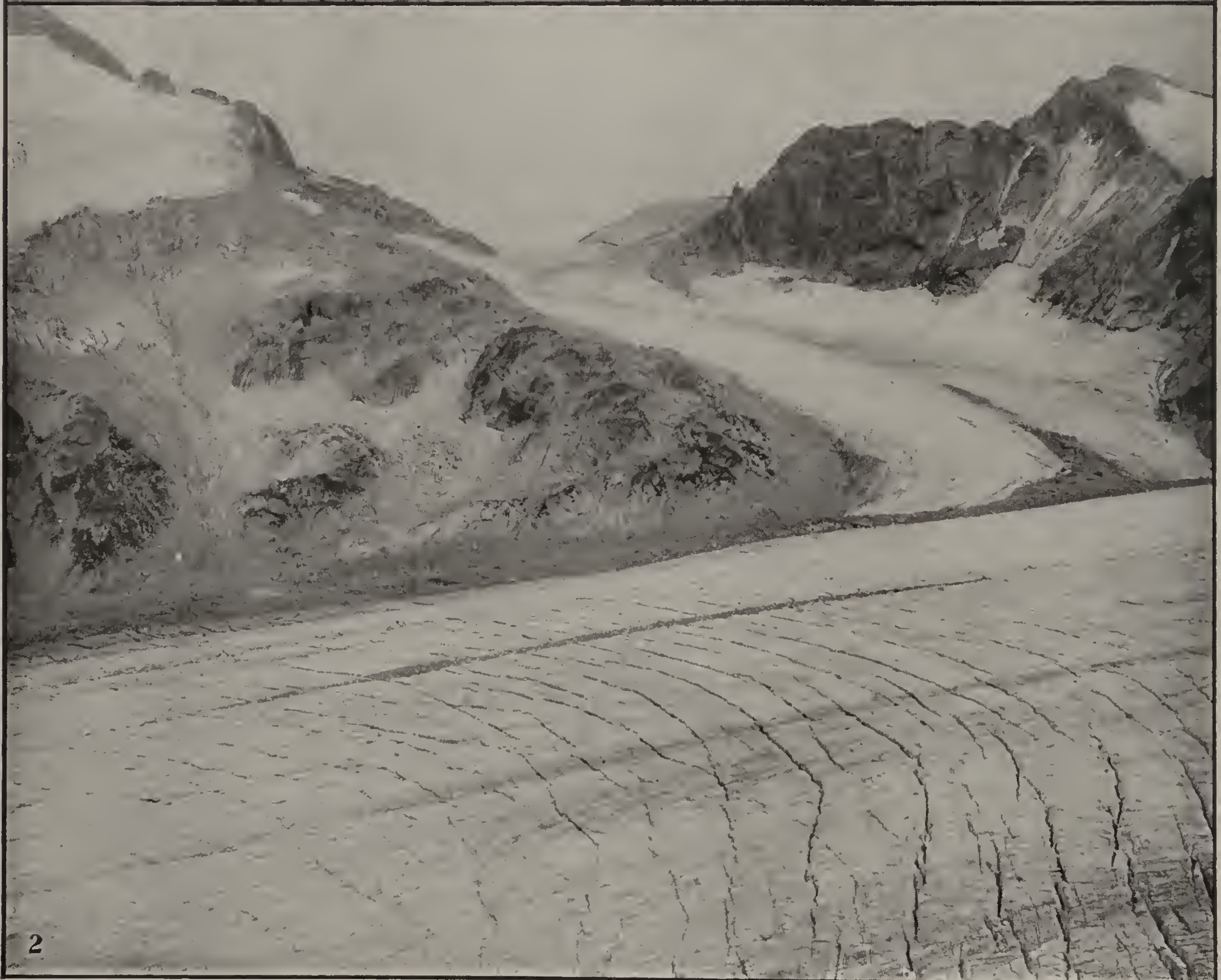




1. Forno Glacier, Switzerland.
2. Sebree Island, Glacier Bay, Alaska, showing rock glaciated by Muir Glacier when it was larger.

GLACIERS

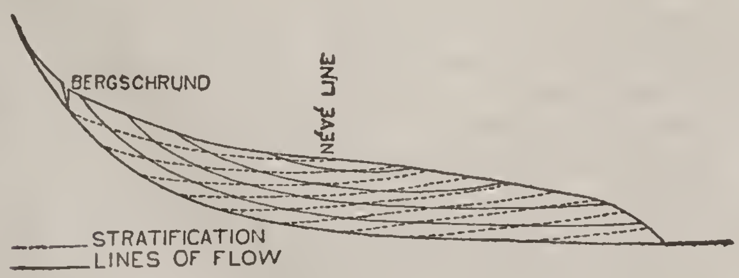




FORNO GLACIER
1. Reservoir showing the névé line, outcrop of the strata and crevasses.
2. View showing moraines.

line drawn upon the surface of the white ice marking out the direction of motion. The ice under the moraine, being protected from the air and sun, does not melt as rapidly as the unprotected ice, and, therefore, is left by the general waste of the surface as a great ridge rising sometimes 100 feet above the general level of the ice. *Reservoir* moraines, so called from their origin, are formed by material falling upon the reservoir, where it is covered by the snow and later brought to the surface of the dissipator by the motion of the ice and the melting. Moraines which can hardly be distinguished from reservoir moraines may sometimes be formed from the material plucked from a projecting point in the bed of the glacier and carried along in the body of the ice, to be exposed later at the surface by the melting. The material pushed along under the ice is called the *ground* moraine; it is made up of débris fallen under the glacier at the sides or through crevasses or the bergschrund, and material plucked from the bed of the glacier.

Structure of the Ice. The origin of the glacial ice is the snow that falls in the reservoir. By thawing and freezing, this soon changes into a turbid ice filled with many air bubbles. Crystallization starts from numerous centres, around which the molecules of ice gradually rearrange themselves until the whole mass is made up of crystals of clear ice (though still containing many air bubbles) with their respective optical axes turned in various directions. The crystals at this stage are about the size of peas and adjoin one another in surfaces which bear no relation to the geometric crystalline faces. By a process of recrystallization some of these crystals grow at the expense of their neighbors until finally many of them become 4 or 5 inches in diameter. During this process the ice is moving down the valley, so that we find the crystals of increasing age, and therefore increasing size, mixed in with smaller ones as we go from the névé fields down the glacier. The sun's rays penetrating the ice for a short distance melt the ice along the junctions of the crystals, which can then readily be separated. The sun's rays also cause melting in the interior of the crystals at various points; the cavities thus formed are flat disks or six-angled stars; as the water occupies less space than the ice from which it was melted, each of these cavities contains a small vacuum which is more easily visible than the sides of the cavity. These cavities are known as Tyndall's figures, and always lie with their flat sides at right angles to the optical axis of the crystal, whose direction may thus be easily determined.



LONGITUDINAL SECTION OF GLACIER.

Stratification and Banded Structure. On the sides of crevasses in the reservoir the layers of hardening snow, due to successive seasons, can be readily distinguished, and the outcrops of these strata can be followed for a short distance into the dissipator; but their appearance soon changes, and the majority of observers claim that as the ice becomes consolidated the marks of stratification are obliterated. In the lower part of the dissipator, where the ice is thoroughly consolidated, it is found to be composed of bands of bluer and whiter ice, the color being caused by the amount of the contained air bubbles. These bands, as described by Forbes and others, follow the general shape of the bowl of a spoon pointing downstream. Each tributary has its own system of bands, though but one system is usually found at the end of the glacier. They are prominent at the sides, near the end, and at the line of junction where two glaciers unite. Three explanations have been given of their origin. Agassiz considered them the modified form of stratification. Forbes looked upon them as surfaces where the principal amount of differential motion took place. Tyndall thought they were caused by pressure and were analogous to the slaty cleavage of rock. Forbes's idea has been practically discarded, and glacialists are divided between the explanations of Agassiz and of Tyndall.

Temperature. Theory and, so far as they go, observations indicate that the body of the glacier is at the temperature of melting ice.

Variations. The relative sizes of the reservoir and dissipator are determined by the condition that the accumulation in the first must equal the waste in the second. The accumulation depends upon the size of the reservoir and the snowfall, and the waste on the size of the dissipator and the rate of melting. The melting is due principally to direct radiation from the sun and to condensation of water vapor from the air; it will readily be seen that in cold wet periods glaciers will advance, and in warm dry periods they will retreat. Glaciers are, therefore, indicators of climatic variations. In the last 30 years much attention has been given to the study of the variations of glaciers. It has been discovered that in the Alps the glaciers have made no permanent change within the last 300 years, but that they have grown larger and smaller in size, making a complete fluctuation on the average once in 35 years. Records of the glaciers of Iceland and of Scandinavia show that in the seventeenth century they were much smaller than they are at present; early in the eighteenth century a general advance began which continued well into the nineteenth century, and was characterized by a very marked increase in the extent of the ice; since then there has been a small retreat. The same general order has been followed in southeastern Alaska, though the dates cannot be definitely determined. It is probable that the glaciers of other Arctic regions have experienced similar variations. With few exceptions, the glaciers in all parts of the world are now in retreat.

Work of Glaciers. The moraines are carried along by the glacier and deposited on the sides of its valley and at the end of the ice. Some rocks become embedded in the ice and act like graving tools in making long, straight scratches in the bed rock, whose surface is also smoothed by finer material moved by the ice. A region which has been covered by a glacier usually shows smooth and rounded rock surfaces marked with parallel scratches; heaps of rocks, more or less angular, are dumped irregularly about, frequently forming small lakes. These rocks are often of a different kind from the underlying country rock, showing that they have been transported from a distance, and their angular or subangular forms show that they have not been transported by water. They are called *erratics.* Among them some will have smoothed and scratched surfaces. It is by studying the distribution of scratches, smoothed surfaces, and erratics, that geologists have been able to show the existence of a former ice age when large parts of Europe and of North America were covered by great sheets of ice.

The power of glaciers to erode valleys or lake basins has been greatly discussed, without a conclusion commanding general assent being reached. Leading geologists entertain diametrically opposite opinions on this subject. Fiords show the effects of ice erosion to a greater or less extent, although in most cases they were originally narrow stream valleys. The work of the ice has consisted in deepening the channels, particularly in the central part which often is lower than the outlet. The mere wear or abrasive action of a glacier on its bed may be relatively slight; on the other hand the ice doubtless exerts a strong plucking force upon rocks, sufficient to tear away any fissured or loosened material.

Bibliography. For general description and theoretical discussion of glaciers, consult: Shaler and Davis, *Glaciers* (Boston, 1881); Agassiz, *Etudes sur les glaciers* (Neuchâtel, 1840); Schmidt, "Eine neue Glacialtheorie," in *Petermann's Mittheilungen,* vol. xliv (Gotha, 1898); Agassiz, *Nouvelles études et expériences sur les glaciers actuels* (Paris, 1847); id., *Untersuchungen über die Gletscher* (Solothurn, 1841); Heim, *Handbuch der Gletscherkunde* (Stuttgart, 1885); Rendu, *Theory of the Glaciers of the Savoy,* trans. by Wills (London, 1874); Forbes, *Occasional Papers on the Theory of Glaciers* (ib., 1859); Agassiz, *Geological Sketches* (Boston, 1890); Gilbert, *Glaciers and Glaciation* (Washington, 1910); Hobbs, *Characteristics of Existing Glaciers* (New York, 1911). Descriptions of individual localities may be found in Reid, *Studies of the Muir Glacier, Alaska* (Washington, 1892); id., "Glacier Bay and its Glaciers," in *United States Geological Survey Report* (ib., 1895); Russell, *Glaciers of North America* (Boston, 1897); Tyndall, *The Glaciers of the Alps* (London, 1860); Martin, *Glaciers and Glaciation in College Fiord, Alaska* (Berlin, 1913). See GEOLOGY.

GLACIER BAY. A glacial fiord extending 60 miles northward from Icy Strait, Alaska. Glacier Bay penetrates the St. Elias Range, which discharges nine great glaciers into the fiord, five having a sea front of 1 mile or more (Map: Alaska, M 6). The largest glacier, named for Professor Muir, is enormous in its proportions. It is over 200 feet high, 3 miles broad at the sea, and is equal in area to the State of Rhode Island. Innumerable icebergs discharge annually, and the bay is so ice-encumbered, for years at a time, as to be dangerous for navigation.

GLACIER BEAR. The small gray bear (*Ursus emmonsi*) of the St. Elias Alps, Alaska. See BEAR.

GLACK′ENS, WILLIAM J. (1874–). An American portrait, landscape, and figure painter, born in Philadelphia. He studied in his native city and in Paris, where he was strongly influenced by the great modern Frenchmen. His art developed through contact with the best of his contemporaries and yet remained personal and original. In the field of illustration, which occupied his attention for some time after his return to America, his remarkable sense of character, expressed in drawing of masterly quality, soon placed him at the head of the profession. His painting was even more important and brought him membership in the Society of American Artists (1905), and an associate membership in the National Academy (1906) and in the Association of American Painters and Sculptors (1911). Among his awards were a gold medal at the Pan-American Exposition at Buffalo (1900) and another at the St. Louis Exposition (1904). Portraits, landscapes, and figure compositions were all handled successfully by Mr. Glackens. From the observation of the daily life of the American city, his interest turned to more specifically æsthetic problems. Among his best-known paintings are "May Day Party," the best picture of its kind thus far painted by an American artist, and "Girls Bathing" (1911).

GLADBACH, glät′bäɢ, or **BERGISCH-GLADBACH,** bĕr′gĕsh-. A town of the Rhine Province, Prussia, 8 miles northeast of Cologne (Map: Germany, B 3). It has four large paper mills, employing 1200 hands; produces cigars, coco-fibre mats, lumber, dyewood, iron ore, machinery and other iron products, powder, and fire brick. Pop., 1900, 11,435; 1910, 15,207.

GLADBACH, or **MÜNCHEN-** (mụn′ᴋen) **GLADBACH.** A manufacturing town of the Prussian Rhine Province, 16 miles west of Düsseldorf (Map: Germany, B 3). Among its many churches is the Münsterkirche, a fine old structure with a Gothic choir dating from the twelfth century, and an eighth-century crypt. There are three monasteries, a synagogue, and a teachers' seminary. Gladbach is the centre of the cotton industry in the Rhine Province. There are establishments for the manufacture of silk and woolen goods, dye and print goods, and thread; also soap, shoes, chocolate, confectionery, wagons, brushes, paper, leather, furniture, machinery, hosiery, books, rope, bricks, and meal. The number of persons employed in the factories is over 16,000. Gladbach had its origin in the Benedictine abbey founded originally in the eighth century, and abolished at the beginning of the nineteenth. Pop., 1900, 58,023; 1910, 66,414, mostly Roman Catholics.

GLAD′DEN, WASHINGTON (1836–). An American Congregational clergyman and writer, born in Pottsgrove, Pa. He prepared for college at the Owego (N. Y.) Academy, and graduated at Williams College in 1859. He was pastor of Congregational churches in Brooklyn, N. Y., Morrisania, N. Y., North Adams, Mass., and Springfield, Mass., from 1860 until 1882, when he removed to Columbus, Ohio, to become pastor of the First Congregational Church there. As an editor, he was connected with the *Independent* from 1871 to 1875, and with the *Sunday Afternoon* (Springfield, Mass.) from 1878 to 1880. He received the degree of D.D. from Roanoke College, Virginia, and that of LL.D. from the University of Wisconsin and Notre Dame University, Indiana, a Catholic institution. His sermons and books show vigorous, direct, and practical thought, and a gift of graceful expression. He put into practice his frequently expressed convictions regarding the duties of citizenship by serving in the city council of Columbus from 1900 to 1902. On Jan. 1, 1914, he retired from active work and became pastor emeritus. His books, sensible and scholarly discussions of social and civil reforms, and of the application of Christianity to everyday life, include: *Plain Thoughts on the Art of Living* (1868); *Workingmen and their Employers* (1876); *Being a Christian* (1876); *The Christian Way* (1877); *The Lord's Prayer* (1880); *The Christian League of Connecticut* (1883); *Things New and Old* (1884); *The Young Men and the Churches* (1885); *Applied Christianity* (1887); *Parish Problems* (1888); *Burning Questions* (1889); *Who Wrote the Bible?* (1891); *Santa Claus on a Lark* (1892); *Tools and the Man* (1893); *The Cosmopolis City Club* (1893); *The Church and the Kingdom* (1894); *Ruling Ideas of the Present Age* (1895); *Seven Puzzling Bible Books* (1897); *Social Facts and Forces* (1897); *The Christian Pastor and the Working Church* (1898); *How Much is Left of the Old Doctrines* (1899); *Social Salvation* (1902); *Witnesses of the Light* (1903), the W. B. Noble lectures at Harvard; *Where Does the Sky Begin?* (1904); *The New Idolatry* (1905); *Christianity and Socialism* (1906); *The Church and Modern Life* (1908); *The Labor Question* (1911); *Present Day Theology* (1913); *Live and Learn* (1914). Consult his *Recollections* (Boston, 1909).

GLADHEIM, glăd′hĕym (Icel., bright abode). In Norse mythology, the dwelling place of Odin, the largest and noblest of edifices. In this home is Valhalla (the hall of heroes), radiant with gold, to which are conducted all who fall in battle. The ceiling is formed of spears, the roof of shields, and the benches are strewn with coats of mail. According to the *Elder Edda* it has 540 gates, through each of which 800 men can go abreast.

GLADIATOR, glăd′ĭ-ā′tor (Lat., swordsman). One who in antiquity fought in the arena, at the amphitheatre in Rome, and in other cities, for the amusement of the public. The gladiators were generally captives, or condemned criminals, or, more often, slaves bought and trained for the purpose by masters (called *lanistæ*) who made this their business. The custom was borrowed by the Romans from the Etruscans. It had its origin in the practice of human sacrifices, or that of taking at funerals the lives of captives or prisoners of war, in honor of heroes who had died in battle.

After a time all great funerals of distinguished men were solemnized by human sacrifices, which took the form of combats, in which, to increase the interest of the spectators, the prisoners were required to kill one another; and as prisoners, and afterward other slaves, were kept for this purpose, they were trained to fight with skill and courage, to make the spectacle more impressive. In time these shows, instead of being a funeral rite, became a common amusement. The first gladiatorial combat we read of in Roman history was a contest of three pairs of gladiators, given by Marcus and Decimus Brutus, on the death of their father, in 264 B.C. In 217 B.C. the first Scipio Africanus diverted his army at New Carthage with a gladiatorial exhibition. In 207 B.C. a show of 22 pairs was given in the Forum. The exhibition of gladiators rapidly became popular. Magistrates, public officers, and candidates gave shows to the people, which consisted chiefly of these encounters. The emperors exceeded all others in the extent and magnificence of these spectacles. Julius Cæsar gave a show of 320 pairs; Titus gave a show of gladiators, wild beasts, and sea fights for 100 days; Trajan gave a show of 123 days, in which 2000 men fought with one another or with wild beasts for the amusement of the Romans assembled in the Coliseum. A vast number of slaves from all parts of the world were kept in Rome, and trained for these exhibitions. Efforts were made to limit the number of gladiators, and diminish the frequency of these shows. The Emperor Augustus forbade more than two shows in a year; he ordered also that no gladiatorial show should be given by a man with a property of less than half a million sesterces. But it was difficult to restrain what had become a passion, and men even had such contests for the amusement of their guests at ordinary feasts. More than once, especially under Spartacus, Clodius, and Milo, the gladiators menaced the peace of Rome.

These shows were announced by show bills and pictures. The gladiators were trained and sworn to fight to the death. If they showed cowardice, they were killed with tortures. They fought at first with wooden swords, and then with steel. When one of the combatants was disarmed, or upon the ground, the victor looked to the Emperor, if present, or to the people, for further directions; if they completely concealed their thumbs, the defeated gladiator was spared; if they turned their thumbs downward, towards the defeated man, he was killed. (On this much-discussed subject, consult an important article by Post, "Pollice Verso," in *American Journal of Philology*, xiii, New York, 1892.) A victorious gladiator was rewarded not only with a branch of palm, but in more substantial ways; sometimes, too, he received his freedom. Though the gladiators at first were slaves, freemen afterward entered the profession. Senators and knights fought in the shows of Nero, and women in those of Domitian. The Emperor Constantine prohibited the contests of gladiators, 325 A.D.; but they could not at once be abolished. In the reign of Honorius a monk, Telemachus, went into the arena to stop the fight, but the people stoned him. Gladiatorial contests were finally abolished by Theodoric (500 A.D.).

The kinds of gladiators most frequently mentioned are the following: the *retiarius*, or net man (Lat. *rete*, net), who wore only a short tunic, and had as his weapon a net, attached to which was a rope, and a trident. He flung his net and, if successful in getting it over the head of his foe, easily dispatched him with his trident; if he failed in his cast, he drew in, if possible, the net with the rope, and fled. His adversary pursued, and so was called *secutor* (Lat., follower). (For these two kinds of gladiators, consult Bulwer, *Last Days of Pompeii*, near the end.) The *Samnites* fought with Samnite weapons—an oblong shield, short sword, plumed helmet. The *Thraces* had a small shield and a sword or dagger curved somewhat like a scythe; they fought against the *mirmillones*, gladiators with Gallic armor, who had a representation of a fish as a sort of crest on their helmets. The *essedarii* fought on chariots (Lat. *essedum*, a British war chariot). The gladiators who fought with wild beasts were known as *bestiarii* (from Lat. *bestia*, a beast, as marked by size or ferocity or both). The contest between men and beasts in the amphitheatre was called *venatio*, a hunt.

For an elaborate account of the gladiatorial combats, gladiators, etc., consult Friedländer, *Darstellungen aus der Sittengeschichte Roms* (8th ed., Leipzig, 1910), vol. ii, translated as vol. ii of *Roman Life and Manners under the Early Empire*, 4 vols. (New York, 1909).

GLADIATOR, The. A tragedy by Robert Montgomery Bird (1841), in which Edwin Forrest frequently took the part of Spartacus.

GLADIATORS' WAR. See Spartacus.

GLADI'OLUS (Lat., diminutive of *gladius*, sword; so called from the form of the leaves). A genus of plants of the family Iridaceæ, with a tubular perianth, the limb of which is divided into six unequal threadlike segments; the stigmas are undivided; and the seeds are winged. The roots are bulbous; the leaves linear or sword-shaped. The Cape of Good Hope produces the greater number of the known species, as also several allied forms once included in this genus. Most of the species have flowers of great beauty. Some of the improved varieties have spikes 2 to 3 feet long and are among the finest ornaments of flower borders and greenhouses. They are propagated either by seed or by offset corms; and in the former way many new varieties have been produced. In the garden culture of gladiolus the corms are planted out in early spring, preferably in sandy loam soil. The flowers open in July and August, and the blooming season can be prolonged by successive plantings in spring and early summer. In the fall the corms are dug and kept in a cold cellar over winter. Formerly southern Europe supplied the world with gladiolus, but the United States now supplies the great bulk of the crop. The gladiolus now has several societies devoted to its welfare. See Plate of Iris Family.

GLAD'STONE. A city in Delta Co., Mich., 9 miles north of Escanaba, on the Minneapolis, St. Paul, and Sault Ste. Marie Railway, on the Escanaba River, and on Little Bay de Nocquet, an inlet of Green Bay (Map: Michigan, C 3). It has a shipping trade in coal and flour and has a cooperage, machine shops, manufactories of veneers, guns, and sporting goods, and lumber mills. Under a revised charter of 1904, the government is vested in an annually elected mayor and a unicameral council. The city owns and operates its water works and electric-light plant. Pop., 1900, 3380; 1910, 4211.

GLADSTONE, glăd'stŭn, Herbert John Gladstone, first Viscount (1854–). An English politician, youngest son of William Ewart Gladstone. He was born in London; was educated at Eton and at University College, Oxford; was lecturer on modern history at Keble College from 1877 to 1880; and was private secretary to his father in 1880–81. He was a member of Parliament for Leeds from 1880 to 1885, and for Leeds, West, until 1909. From 1881 to 1885 he was Junior Lord of the Treasury, and he served also as Financial Secretary to the War Office (1886), Under Home Secretary (1892–94), and First Commissioner of Works (1894–95). He was chief Liberal whip from 1899 to December, 1905, and in 1905–10 was Home Secretary in the Campbell-Bannerman ministry. In 1909 he was named the first Governor-General and High Commissioner of South Africa. He was made Viscount in 1910, also G. C. M. G., and in 1914 G. C. B. In February, 1914, he resigned the governor-generalship of South Africa (after a good deal of trouble over labor and racial difficulties).

GLADSTONE, John Hall (1827–1902). A British physicist and chemist, born at Hackney, London. He studied at University College, London, and graduated as Ph.D. from the University of Giessen. He lectured at St. Thomas's Hospital in 1850–52; served on the lighthouse commission in 1858–61 and the War Office committee in 1864–68; and was professor of chemistry at the Royal Institution in 1874–77. He was one of the first investigators in the field of physical chemistry, notably in the relation of optics and spectroscopy to chemistry. With his assistant, Alfred Tribe, he is responsible for the copper-zinc couple. Actively interested in educational reform, he especially advocated changes in spelling. In 1853 he was elected a fellow of the Royal Society, which awarded him the Davy medal in 1897, and was first president of the Physical Society in 1874 and president of the Chemical Society in 1877–79. Besides a great number of scientific papers he wrote books and pamphlets on Christian evidence and apologetics, and also *Michael Faraday* (1872); *Spelling Reform* (1878; 2d ed., 1879); *Object Teaching* (1882).

GLADSTONE, William Ewart (1809–98). A British statesman. He was born Dec. 29, 1809, of Scottish parentage, in the city of Liverpool, where his father was a wealthy merchant, a member of Parliament, and a baronet. In 1821 he was sent to Eton, and in 1828 he entered Christ Church College, Oxford. Both at Eton and Oxford, Gladstone was distinguished for application to his studies, for his religious tendencies, his love of outdoor life, and his fondness for oratory and debate. He was successively secretary and president of the Oxford Debating Union, and in that society he delivered a powerful oration against the Reform Bill, which had been introduced into the House of Commons in 1831. In that year he took a double first in classics and mathematics.

Gladstone left Oxford in the spring of 1832, and after spending six months in Italy, entered Parliament as a member for Newark. The House of which he was a member was the first to be seated under the Reform Bill, which he had attacked while in college. He naturally attached himself to the Tory opposition under Sir Robert Peel, and waited for that party to come into power to win advancement. He delivered his maiden speech on June 3, 1833, in vindication of his father from charges brought against him concerning his conduct towards the slaves on his plantation in Demerara. In the last week of 1834 Peel came into power, and in January, 1835, he appointed Gladstone a Junior Lord of the Treasury, and in the following month Undersecretary for the Colonies. The Parliament elected in February, however, had a Liberal majority; on April 8 the Tory government went out and Gladstone again became a private member, which he remained until 1841, when, on Sir Robert Peel's coming back into power, he was appointed Vice President of the Board of Trade and Master of the Mint. In May, 1843, he became President of the Board of Trade, and so gained his first seat in a cabinet. Both as Vice President and as President he took a leading share in the work of reforming the tariff, and thus got his first lesson in finance. Already he gave unmistakable signs of genius in this direction, both in the work of arranging schedules and in the defense of his proposals on the floor of the House in exposition and debate. For a moment he endangered his career by resigning his office through uncertainty as to

WILLIAM EWART GLADSTONE
FROM A PHOTOGRAPH TAKEN IN 1896

the support he should give an important government measure concerning an increased grant to Maynooth College, the Irish training school for Catholic priests. To Gladstone this seemed opposed to the principles he had supported in a book on the relations of the church and state, published by him in 1839, in which he had stood for a single church establishment under the control of the state, of which it should be the conscience. Rather than run the risk of compromising himself before his own conscience he resigned his office (Jan. 28, 1845) and became once more a private member of the House.

In December, 1845, he was appointed by Peel to the office of Colonial Secretary. To accept this he had to vacate his seat. This was the one break in a parliamentary career extending over more than half a century. Gladstone now gave Peel his assistance in formulating his free-trade measures which led to the repeal of the Corn Laws in 1846. In 1847 Gladstone resumed his seat in the House as Tory member for Oxford. In 1850 Peel died, and the first period in Gladstone's career, the period of apprenticeship to this great master, was terminated.

The new period extending from 1850 to 1868 may be called Gladstone's period of independent political reform. In 1852 he first came into conflict with his great rival, Disraeli, whose budget in that year he completely annihilated, thus bringing about the fall of the Derby ministry (December 17). In 1853 he presented his own first budget as Chancellor of the Exchequer in Aberdeen's coalition cabinet, and scored the first great personal triumph of his career. This budget was a masterpiece of equable and efficient taxation. It increased the revenues of the state and placed the burden of the impositions where they could best be supported. His plans, however, especially in the matter of the income tax, which he was proposing by gradual steps to abolish completely, were somewhat interfered with by the intervention of the Crimean War, which demanded a new budget with increased taxation. In this budget Gladstone insisted that all the funds needed for the prosecution of the war should be raised by taxation, and not by the negotiation of loans. The conduct of the war, however, hurt the prestige of the Aberdeen government, and on Jan. 29, 1855, the ministry resigned. But Gladstone was the "inevitable" Chancellor for any administration, and he accepted the same office in Lord Palmerston's cabinet, resigning it, however, at the end of three weeks. He remained out of office for three years, during which time he published his *Studies on Homer* (1858) and undertook a mission to the Ionian Islands, where a strong agitation was being carried on for the cessation of British rule and annexation to Greece. In 1859 he returned to the Exchequer in the cabinet of Lord Palmerston, and in 1860 and 1861 he issued budgets that were marvels of financial statesmanship. He had now allied himself completely with Bright and Cobden, the latter of whom he had heartily supported in his attempt to negotiate a commercial treaty with France. This was accomplished in January, 1860. By his masterly tactics Gladstone won a complete victory over the House of Lords in 1861 after it had defeated his measure for the abolition of the tax on paper in the previous year. This was a great victory for popular education and the free press, and from that time dates the era of cheap newspapers for the people in England.

In July, 1865, Gladstone was defeated for Parliament at Oxford, but returned from South Lancashire. Lord Russell (q.v.) became head of the ministry and made Gladstone Chancellor of the Exchequer and leader in the House of Commons. In 1866 Lord Russell brought forward his first bill for the extension of suffrage and the redistribution of seats in the House of Commons. The support of this measure marks the beginning of Gladstone's adhesion to the Liberal party, towards which he had long been tending. His acceptance of office under Palmerston while still professing Tory principles was the first step in this direction. His defeat by his Oxford constituents because of his Liberal affiliations and tendencies strengthened his resolution to make his abandonment of Toryism definite. As for the bill itself, Disraeli and others united to defeat it, and the Liberal government was forced to resign (June 19). Lord Derby and Disraeli on their accession to power introduced another reform bill even more radical than that of Gladstone, who gave the new measure his hearty support, helping to carry it through in 1867.

In December, 1867, Gladstone succeeded Lord Russell as leader of the Liberal party. In this capacity he vigorously assailed the Conservative ministry, which after Feb. 26, 1868, was headed by Disraeli. In November the ministry appealed to the country on the question of the disestablishment of the Irish church, which had been made by Gladstone a party issue, and in the new Parliament the Liberals gained an overwhelming majority. On Dec. 4, 1868, Gladstone became Prime Minister and started in at once on a campaign of reform in Irish affairs. The disestablishment of the Irish church was effected in July, 1869, after a bitter struggle in the House of Lords. The next thing he essayed was to reform the Irish land system. This bill, though moderate in character, was nevertheless a step forward in the direction of giving the tenants more rights and keeping them from being crushed at pleasure by their landlords. This bill was carried in 1870. He also sought to establish an Irish National University that would satisfy the just demands of the Catholics of Ireland. This measure was defeated and he resigned (March, 1873). Disraeli refused to form a ministry, so Gladstone was forced to resume office for a time, though his strength was insufficient to carry any important reform measure. In January, 1874, he called for a dissolution in order to increase, if he could, the strength of his party in the House by a general election. The election brought defeat instead, and Disraeli returned to power. Gladstone, wearied with the weight of affairs, resigned (1875) his leadership and retired from official life.

The news of the Bulgarian horrors (1876) brought Gladstone once more into public life. By his speeches and pamphlets he aroused public feeling to the highest pitch of excitement, and throughout the Russo-Turkish War he denounced the pro-Ottoman policy of Lord Beaconsfield, acting once more as the leader of his party. On the issue of the Russo-Turkish War the Liberals carried the country in 1880, and Gladstone, elected from Midlothian, on April 23 became Prime Minister. Gladstone now resumed his position at the head of the Liberal party. He started in at once to continue the work of his first ministry. He introduced a second Irish Land Bill, which was thrown out of the House of Lords. Ireland began to grow impatient and the Nationalist leaders in Parliament restive. The Home Rule movement took a new lease of life under Parnell, Dillon, and others, but as yet Gladstone had nothing in common with their cause. His ministry lost prestige in the conduct of affairs both in Ireland and abroad. The assassination (1882) in Phœnix Park, Dublin, of the Chief Secretary for Ireland, Lord Frederick Cavendish, and his undersecretary, Burke, followed by repressive legislation on the part of the government, alienated the Irish members in Parliament. The defeat of Majuba Hill (1881), and the generous terms of peace conceded the Boers, aroused public dissatisfaction. The failure to relieve Khartum, and the tragic death of General Gordon (1885), were fatal blows to the ministry. On June 8, 1885, Gladstone resigned and was succeeded by Lord Salisbury. The elections of November showed a slight preponderance of Conservatives and Parnellites over Liberals. To gain the support of the latter, Gladstone announced his adhesion to Home Rule; the Conservative government was overthrown, and on Feb. 1, 1886, Gladstone succeeded to the premiership for the third time. In April a Home Rule bill was brought into Parliament. (See HOME RULE.) The measure met with opposition from all sides. The Irish members objected to the clause which deprived Ireland of representatives to the Imperial Parliament. A serious defection occurred in the Liberal ranks, Lord Hartington and Mr. Goschen refusing to support the government, and being supported in their action by John Bright and Joseph Chamberlain. On June 7 the bill failed to pass a second reading, 93 Liberal votes being cast against it. Parliament was dissolved on June 26, but the elections resulted in the decisive defeat of the Liberal party, and on July 20 the ministry resigned. The elections of 1892 showed a majority of 40 for Home Rule, and on August 15 began Gladstone's fourth and last ministry. In 1893 a new and amended bill was brought before the House, and Gladstone, making the last great official fight of his life, triumphantly carried it. The House of Lords, however, threw out the measure (September 8), and the last stage of Gladstone's life work ended in apparent failure. Weary of the tumults of parliamentary life, he laid down his office on March 3, 1894, being succeeded by his colleague Lord Rosebery.

The last participation of Gladstone in public affairs was in connection with the Armenian massacres in 1896. He addressed meetings throughout the country and aroused public feeling, as he had done in 1876 over the Bulgarian atrocities. In 1898, on the 19th of May, he died in the eighty-ninth year of his life. He lies buried in the statesmen's corner of Westminster Abbey.

Gladstone was the greatest of the long line of Victorian political leaders and prime ministers. His only rival was Disraeli; but he had moral qualities which Disraeli lacked, and these more than made up for the superior brilliancy of the other, who looked with some contempt on Gladstone's principles and seriousness. Gladstone has been called an opportunist, and it is true that he more than once changed his position and went over to those against whom he had fought previously; but for any one who has studied Gladstone's career carefully these changes were not without a law of their own in Gladstone's intellectual development. Each change bore a relation to a previous change, and viewing his career in the large we perceive a steady, gradual, and consistent progress. This is more than can be said of Disraeli, who, reversing his position quite as completely as Gladstone, did it to serve his own private ambitions. Gladstone cared too little for power, refused office too often, and incurred the anger of his constituents too readily by disregarding their wishes in matters of foreign and domestic policy, for it to be thought that he would ever have sacrificed his convictions to insure his own success. It was against his inclinations that he had entered public life in the first place. If once in the battle he stayed there, it was from a sense of duty characteristic of his moral seriousness. He always preferred his leisure, and more than once he withdrew from public affairs only to reënter the arena at the first recall.

Little has been said of Gladstone's literary labors, which were enormous. He was a scholar of the old type, caring only for literature and nothing for natural science. Many of his ideas were antiquated, for in literature he always remained the Tory, whatever he became in politics; that is to say, he believed in the principle of authority. To him the Bible was always the word of God and the law of Moses the law of Moses, while Homer was a real man describing real historic events. Still it is well to remember that Gladstone stood for an attitude towards the classics and the Scriptures which is associated with the high influence these works of antiquity have had for the race's civilization. There is something to be said for Gladstone's conservatism, perhaps even as against his radicalism in politics.

As to what Gladstone accomplished with his reforms in politics, it is too early to pass a complete judgment. It is as a reformer in finance and as a defender of the liberties of all classes of the English people that he stands forth most strikingly in history. Free trade, equal taxation, popular education, manhood suffrage—these are the great causes with whose beneficial results he is identified to his greatest glory. It is in his foreign policy that he was weakest. Domestic questions interested him almost to the exclusion of foreign matters, excepting when a race or a nation was suffering from oppression or tyranny. The wrongdoings of the Turks in particular called forth his denunciation, and he was always preaching, as it were, a holy war against the Moslem. He contributed to the independence and union of Italy by his letter about the political crimes of the rulers of the Two Sicilies. Mention has been made of his efforts on behalf of Bulgaria and the Armenians. On the other hand, because he cared nothing for foreign policies as such or for England's national prestige, he incurred the opprobrium of the people through what appeared to be his neglect of Gordon at Khartum, his submission to the Boers in South Africa, his willingness to submit to arbitration with the United States, and other matters in all of which he was content if he could avoid war and maintain an honorable peace. Personally Gladstone was a man full of charm and grace in his early years and full of dignity and grandeur in his old age. Justin McCarthy spoke well when he said that the House of Commons was no longer the same place without him.

Gladstone contributed articles on literary and political topics to the *Quarterly Review* and other magazines. Most of these were published under the title, *Gleanings from Past Years* (8 vols., 1879–90).

In 1839 Gladstone married Catherine, the elder daughter of Sir Stephen Richard Glynne, of Hawarden Castle. She died on June 14, 1900. Four sons and four daughters were born, of whom the eldest, William Henry Gladstone, died in 1891, after sitting in Parliament from 1865 to 1885; Stephen Edward Gladstone is rector of Hawarden; the youngest son, Herbert John (q.v.), became member of Parliament in 1880. The youngest daughter, Helen, was for a few years vice principal of Newnham College, Cambridge.

Bibliography. Morley, *Life of William Ewart Gladstone* (3 vols., London, 1903; new ed., 1911), is a masterly work. Consult also: Archer, *William Ewart Gladstone and his Contemporaries* (ib., 1883); Russell, *Biography of W. E. Gladstone* (ib., 1891); Leech, *W. E. Gladstone: Life in Speeches and Public Letters* (ib., 1893); Robbins, *Early Public Life of Mr. Gladstone* (ib., 1894); McCarthy, *The Story of Gladstone's Life* (ib., 1897); Bryce, *Gladstone: His Characteristics as Man and Statesman* (New York, 1898); Williamson, *W. E. Gladstone, Statesman and Scholar* (London, 1898); Paul, *The Life of W. E. Gladstone* (ib., 1901); Smith, *My Memory of Gladstone* (New York, 1905); Slicer, *From Poet to Premier* (ib., 1909); Eversley, *Gladstone and Ireland* (London, 1912).

GLAGOLITSA, glăg′ō-lĭt′sȧ. One of the old Slavic alphabets, which contains characters arranged in the same order as in the Kirillitsa or Cyrillic (q.v.) alphabet. The shape as well as the numerical value of its letters is different from that of the Kirillitsa. The name is not derived from the fourth letter of the alphabet, *glagol*, but it is so called since it is a collection of significant, telling signs (from OChurch Slav. *glagolati*, to speak). Kirillitsa is chronologically an earlier name, but there are good reasons to believe that it was the original name of what is now known as Glagolitsa. Jagič upholds the very plausible theory that Cyril invented Glagolitsa. Taylor (*Archiv für slawische Philologie*, vol. v, Leipzig, 1881) and Jagič derive it from the cursive Greek (not uncials) of the eighth and ninth centuries. Only the following can be set down as positive facts: Glagolitsa began to spread not later than Kirillitsa, among both the southern and the western Slavs. Then it went out of use completely in the south; in the West it was also superseded by the Roman alphabet in Bohemia; while in Croatia and Dalmatia it long maintained its existence with difficulty, and Pope Leo XIII shortly before his death sanctioned the publication of ecclesiastical books in Glagolitsa characters. The Bulgarian ductus of the Glagolitsa is round, while the Croatian is more angular. The earliest Glagolitic manuscript extant belongs to the eleventh century. It is in the collection of Count Clotz, published at Vienna by Copitar in 1836 and known as *Glagolitsa Clozianus*. On account of the difficulty of reading, the Glagolitic monuments are usually printed transliterated in the Cyrillic alphabet. Consult: Taylor, *The Alphabet*, vol. ii (1899); the various papers by Jagič enumerated in his *Festschrift* (Berlin, 1908); Leskien, "Zur glagolitischen Schrift," in *Archiv für slavische Philologie* (ib., 1905), and his *Grammatik der altbulgarischen Sprache* (Heidelberg, 1909); Murko, *Geschichte der älteren südslavischen Litteraturen* (Leipzig, 1908); Geitler, *Die albanesischen und slavischen Schriften* (Vienna, 1883, with facsimiles).

GLAIS-BIZOIN, glȧ′bē′zwăN′, Alexandre (1800–77). A French legislator, born at Quintin (Côtes-du-Nord). After participating in the opposition to the government of the Restoration, he was elected deputy from Loudéac in 1831, served in that capacity for 17 years, and in 1848 became a member of the Moderate Republican party in the Constituent Assembly. He was in the Corps Législatif from 1863 to 1870, and then was appointed a member of the provisional government. In May, 1871, he was arrested and imprisoned for a short time during the reign of the Commune. His *Dictature de cinq mois* (1872) discusses the national defense during the Franco-German War.

GLAISHER, glā′shẽr, James (1809–1903). An English meteorologist and aëronaut, born in London. In 1850 he established the Meteorological Society, serving for many years as its secretary, and in 1866 was one of the founders of the Aëronautical Society of Great Britain. He is remembered especially for the balloon ascensions which he made between 1862 and 1866 in the interest of science. During his seventh ascension, Sept. 5, 1862, he and his pilot Coxwell attained an unprecedented height for a balloon carrying passengers. The best recent recomputations put the height he then attained at 8500–8700 meters, or 27,887–28,543 feet—an altitude that has been only slightly exceeded by modern aëronauts (9155 meters, or 30,025 feet, by Berson on Dec. 4, 1894) provided with artificial supplies of oxygen for overcoming the rarity of the atmosphere at these great heights. He held many important positions and published numerous books and papers on various topics connected with the mathematical sciences. His best-known work is *Travels in the Air* (1800). For a critical discussion of his famous high ascension of September, 1862, consult *Wissenschaftliche Luftfahrten* by Assmann and Berson (3 vols., Brunswick, 1899–1900).

GLAISHER, James Whitbread Lee (1848–). An English mathematician, born in Lewisham, Kent, a son of the preceding. He was educated at Trinity College, Cambridge, of which he became a fellow in 1871, was tutor in 1883–93, and lecturer in 1871–1901. He became editor of the *Messenger of Mathematics* in 1871 and of the *Quarterly Journal of Pure and Applied Mathematics* in 1878, was a prominent member of several English mathematical and astronomical societies, and wrote, in their *Proceedings* and elsewhere, many papers on pure mathematics, especially on the theory of numbers.

GLAIZE, glāz, Auguste (1807–93). A French historical and genre painter and lithographer, born at Montpellier. He studied painting and lithography in Paris as the pupil of Eugène and Achille Devéria. After a few early works, such as "Dante Writing his 'Divine Comedy'" (1847), he turned his attention to the representation of abstract ideas in philosophy and ethics. His most important canvases in this manner are "The Drama of Human Folly" (1872; Arras Museum); "The Pillory" (Marseilles Museum); "What One Sees at Twenty" (Montpellier Museum). His work displays powerful color effects and abundant invention. He further executed several frescoes in the churches of Saint-Sulpice, Saint-Eustache, and others.

His son, PIERRE PAUL JEAN (1842–), was born in Paris and was a pupil of his father and of Gérôme. His best-known painting is "Fugitives from Athens" (Amiens Museum), which, like all his work, is graceful and effective in design.

GLAMMIS (glämz *or* glăm'ĭs) **CASTLE.** The imaginary scene of the murder of Duncan in Shakespeare's *Macbeth.* It is an ancient castle, the seat of the Earl of Strathmore, near Strathmore, Scotland, and is a fine example of the Scottish baronial castles.

GLAMOR'GANSHIRE (Welsh *Gwlad Morgan, Morganwg*). The southernmost county of Wales, bounded on the north by the County of Brecon, on the east by Monmouth, on the south and southwest by the Bristol Channel, and on the west by the County of Carmarthen (Map: Wales, C 5). The county is remarkable for its coal beds and its great iron industry. It also produces a considerable amount of grain, as well as large numbers of cattle, sheep, horses, and hogs. The chief towns are Cardiff, the capital, Merthyr-Tydvil, and Swansea. Area, 809 square miles. Pop., 1901, 859,931; 1911, 1,120,910.

GLAMOR'GAN TREATY. A compact made with the Irish Roman Catholics by the Earl of Glamorgan on Aug. 25, 1645. By it Charles I was to receive military aid, and Roman Catholicism was promised a more formal recognition by the government.

GLANCE (Eng. equivalent of Ger. *Glanz*, glitter, used in the same sense). A name formerly applied to minerals which have a lustre similar to that of metals. The following are some of the more important of these minerals: *antimony glance,* which is the mineral *stibnite,* or antimony trisulphide; *bismuth glance,* which is *bismuthinite,* or bismuth trisulphide; *copper glance,* which is *chalcocite,* or cuprous sulphide; *glance blende,* which is *albandite,* or manganese sulphide; *glance coal,* which is *anthracite,* or hard coal; *glance cobalt,* which is applied both to *cobaltite,* or cobalt sulpharsenide, and to *smaltite,* or cobalt diarsenide; *gold glance,* which is *sylvanite,* or gold and silver telluride; *lead glance,* which is *galena,* or lead sulphide; and *silver glance,* which is *argentite,* or silver sulphide. The name *glance wood* has been applied to an exceedingly hard variety of wood that is found in the tropics and is used for making tools.

GLANCE COAL. A popular term for any hard lustrous variety of coal, but usually applying to anthracite.

GLAND (Lat. *glans,* acorn). A term applied to a secreting organ. Glands are divided by anatomists into two great classes, viz., true secreting glands and ductless glands. The first class constitute special organs which are destined for the production of the chief secretions; as, e.g., the lachrymal, mammary, and salivary glands, the liver, pancreas, and kidneys; while the suprarenal capsules, the spleen, the thymus, and the thyroid belong to the second class.

Secreting Glands. A secreting gland consists of an aggregation of follicles (small tubes or sacs), all of which open into a common duct, by which the glandular product is discharged. The follicles are lined with epithelial cells, placed upon a hyaline basement membrane, which in turn is surrounded by a network of capillaries. These furnish the blood from which is elaborated the secretion by the cell substance or protoplasm of the epithelia, according to one theory. Some assert that the secretion is composed of transformed cell substance. The secretion of a gland is either mucous (like saliva), serous (like tears), sebaceous (like the oil of the skin), or albuminous. The secretions of the testicle and ovary (not properly termed glands) are notable for containing living cells, the spermatozoa and the ova respectively. The simplest form of gland is the inversion of the surface of a secreting membrane into follicles, which discharge their contents upon it by separate mouths. Of this we have examples in the gastric glands and follicles of Lieberkühn, described under DIGESTION, ORGANS OF. Secreting glands are divided into: (1) *tubular,* consisting of cylindrical tubes, single or branching; and (2) *saccular,* composed of numerous sacs arranged about a short tube which joins other similar tubes. The sacs are called *acini,* and such glands are also called *racemose* (Lat. *racemus,* a bunch of grapes). To understand the structure of a complex gland like the liver or kidney, it must be followed from the simplest form in which it is known to occur through its various degrees of evolution. In this way the liver may be traced, from the lowest mollusca (where it exists as simple follicles, lodged in the walls of the stomach, and pouring their product into its cavity by separate orifices) up to man, in whom it is a highly complex organ; and similarly in the early fœtal state of the higher animals, the liver and other secreting organs more or less resemble the persistent state of those parts in animals lower in the scale. In the same way the mammary gland, which is a structure of considerable complexity in the higher animals, presents a very simple arrangement in the lowest type of this class, the ornithorhynchus, being merely a cluster of cæcal follicles, each of which discharges its contents by its own orifice. Sometimes a gland has several ducts (as, e.g., the lachrymal gland), but as a general rule the most important glands have only a single canal, formed by the union of the individual ducts, which conveys the product of the secreting action of the whole mass.

Ductless Glands. Glands of the second class resemble those of the first class in external conformation and in the possession of a solid parenchymatous tissue, but differ from them in the absence of a duct or opening for the removal of the products of secretion; and indeed, except in the case of the thymus, no material resembling a secreted product is yielded by any of them. In all of them the tissue mainly consists of cells and nuclei, with a great abundance of blood vessels. They furnish necessary material to the body in some yet unascertained way. If they are removed by operation, or absent from birth, or atrophied during life, the result is a condition of disease.

The *thyroid* (weight, 30–40 grams) is a very vascular gland, lying on the front and sides of the larynx, composed of connective tissue and follicles containing a viscid colloid substance, the product of the cells. It is a storage gland containing chemically large amounts of iodine combinations. Thyroid secretions have trophic functions with special reference to the nervous system. Absence of the thyroid gland in childhood is characteristic of cretinism (q.v.). Atrophy of the gland in adults causes myxœdema (q.v.). Hypertrophy of the thyroid causes Basedow's disease (q.v.). After thyroidectomy there is diminished albumen and fat metabolism and lessened assimilation of sugar.

The *parathyroids* are smaller glands, closely connected with the thyroid anatomically, but having different functions. The parathyroids may be thought of as a neuromuscular balance wheel, or control. They have antitoxic functions also. If they are removed, tetany results. When the thyroid is absent, its functions may be replaced by administering the thyroid gland from sheep or the extract of it. Cretinism is so treated and cured universally.

The *pituitary body*, or *hypophysis*, is a gland of five grams' weight at the base of the brain. It is composed of two portions, seeming to have different functions not yet determined. In some way they preside over the nutrition, especially of the skeleton. Hypertrophy of this gland is associated with acromegaly (q.v.).

The *thymus gland* lies in the neck of the infant and behind the sternum. At birth it weighs 14 grams, at 14 years 27 grams, and then gradually atrophies. It is supposed to regulate nutrition and control blood pressure. Hypertrophy of the thymus has been given as the cause of sudden death in infants. In *status thymico-lymphaticus* the heart and arteries are very weak, the patient anæmic and generally sluggish. The condition predisposes to tuberculosis, and more than half of such subjects are found to die early of infectious diseases.

The *suprarenal* glands weigh about four grams and lie above the kidneys. They consist of medullary and cortical substance, the latter the most important. The internal secretion of these glands is essential to life. Their function is to control pigmentation of the skin, to arrest the action of poisons found in the body, and to govern the vasomotor system regulating blood pressure. An extract of the glands occurs as a definite chemical substance in the form of white crystals. This extract administered to man or other animals produces constriction of the blood vessels.

Addison's disease (q.v.) is a condition in which there is destruction of the adrenals with deep bronzing of the skin and great weakness. Administering adrenalin continuously will relieve it.

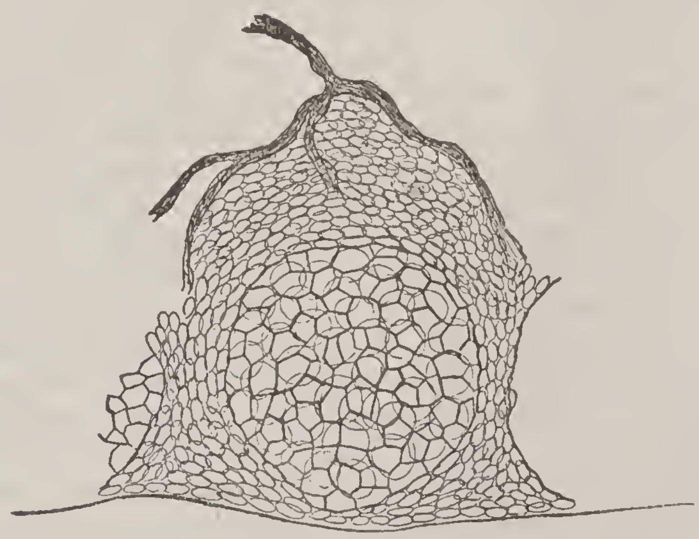
Mention should be made of the carotid, sacral, and abdominal-aortic paraganglion, etc., though their function is unknown. Consult: Luciani, *Human Physiology* (1913); Sajous, *The Internal Secretions* (6th ed., Philadelphia, 1914); Wm. H. Thomson, *Clinical Medicine* (1914). *The Internal Secretory Organs*, by Biedl (1913), contains a voluminous bibliography. See SUPRARENAL CAPSULES.

The so-called *lymphatic glands* belong to a different class of structures and will be described in the article under LYMPHATIC. They are not glands, but nutritive organs. See BARTHOLIN'S GLANDS; BRUNNER'S GLANDS; COWPER'S GLANDS; BREAST; LIVER; PANCREAS; KIDNEY; THYROID GLAND, COMPARATIVE ANATOMY OF. Consult: Gray, *Anatomy, Descriptive and Applied* (Philadelphia, 1913); Heitzmann, *Atlas der descriptiven Anatomie des Menschen* (Leipzig, 1902); Freeborn, *Notes on Normal Histology* (New York, 1901); Stoehr and Lewis, *A Text-Book of Histology* (Philadelphia, 1913); Cunningham, *Textbook of Anatomy* (New York, 1913).

GLAND. In plants, a single cell or group of cells especially adapted to form and secrete some substances. Glandular cells are usually distinguished from others by the granular character of their protoplasm, especially when in the active state. Glands may be superficial or internal. *Superficial glands* may consist of a few cells or even a single cell, in which case they are often raised upon stalks and constitute the so-called glandular hairs, as upon the leaves of geraniums and primroses; they may have the form of disks upon short stalks, in which case the structure is known as a glandular scale; they may be groups of epidermal cells covering cushions of tissue, as in the so-called nectary (q.v.) in many flowers; they may be flush with the surface, pouring their secretion into gland-lined pits or depressions which may be narrow and deep or even branched canals, as in the nectar glands of some lily flowers. *Internal glands* in their simplest form consist of cells in which the secretion is formed and retained until released by the rupture or crushing of the tissues, as in the gland cells of capers. Not uncommonly the gland cells are destroyed by the plant itself, in which case the freed secretion occupies their place, as in the oil glands of the orange and lemon rind; in other cases they line an internal spherical or tubular reservoir, into which the secretion is poured, as in the resin tubes of pines (see figure).

Regarding the process of secretion nothing is definitely known. The secretion in most cases is formed by the protoplasm and within the cell wall; in others it may be developed at the surface, the materials for it being secreted by the protoplasm. In superficial glands the secretion is sometimes pushed through the cell wall as far as the cuticle, which it cannot penetrate, but which it lifts into a blister, e.g., the volatile oils secreted by many leaves.

Glands are named for the most prominent material which they secrete, as water, lime, nectar, oil, and resin glands.



GLAND OF ORANGE RIND.

The gland cells form a globular mass, secrete an essential oil, and finally become disorganized, leaving the oil free in the space they formerly occupied. The contents of the cells are not shown.

GLAND, COMPARATIVE ANATOMY OF. Neither a definition nor a classification of glands has yet been agreed on by comparative anatomists. Since the word itself offers no clew to its real meaning, we must attempt to define it from universally accepted examples. Among these may be mentioned salivary glands, lachrymal glands, sweat glands, and poison glands. All of these are organs which produce some particular substance from the blood with which they are supplied; furthermore, this substance is not cellular nor living, but is a mere chemical product. These facts give us a clew to our definition, and we may say that a gland is any cell or group of cells whose function is the production of a chemical substance, usually fluid, peculiar to itself. Such a definition will not include all those organs to which the name "gland" is given, but it will include all to which it ought to be applied. As an example of the incorrect use of the term, we may refer to "reproductive" or "genital" gland, as applied to the testis or ovary. These organs are not in any true sense glands, for they do not produce any chemical substance peculiar to themselves, but are simply the portions of the body where those cells are formed from which the next generation arises. So also the use of "gland" in connection with the suprarenal capsule, the pituitary body, and the pineal body is incorrect and confusing.

Various classifications for glands have been proposed based on their structure, whether unicellular or multicellular, simple or branched, etc.; but it is perhaps as natural and certainly as convenient to arrange them according to their function. Thus we may class those which open on the surface of the body and are developed in the skin as tegumentary glands; those connected with the process of digestion as digestive glands; those connected with the blood system as vascular glands; those associated with the respiration as respiratory glands; and those connected with the reproductive organs as reproductive glands. The tegumentary glands may well be grouped according to their structure, as unicellular and multicellular glands, and the same classification is often applied to all glands.

Unicellular glands are everywhere abundant in invertebrates, but in vertebrates they are confined almost entirely to the lower forms. Multicellular glands are to be regarded as aggregations of unicellular glands in one region. Soon the multicellular gland differentiates into a secretory and an efferent part, or duct. Multicellular glands with ducts are tubular or acinous. Globular glands also occur in the epidermis of Amphibia. The tubular glands may be simple, branched, or anastomosing. Tubular glands first occur in the Amphibia in a few cases, but they are very abundant as sweat glands in mammals. Acinous glands first appear in birds as uropygial glands, where they occur on the rudimentary tail and produce the oil for oiling the feathers. Among mammals acinous glands are highly developed and are of two kinds, viz., sebaceous glands and milk glands. The sebaceous glands open on the rim of the eyelid and on other special parts of the body, in intimate relation with hairs. In addition to oiling the hair, these glands probably have a sexual function in mammals, since their secretion has a decided odor.

Milk glands, characteristic of the mammalia, have probably a common ancestry with sebaceous glands, or they may even consist, indeed, of a group of highly specialized sebaceous glands. The glands of Echidna occur in the mammary pocket. Into this pocket the immature hatched young are placed, and there they are nourished by a secreted substance which is not like the milk of other mammals. The glands are in connection with hair follicles. Among marsupials there is a larger number of mammary pockets; but these pockets have lost their protective function, which latter function is assumed by the marsupium. In Ornithodelphia the nutritive function is subserved by the secretions of sweat glands. The region of the integument, at which the glands open, is usually modified for the purpose of transmitting to the young the secretion of the glands. There are three types of these openings. The athelous type is found only in the lowest mammals; here the glands open diffusely on the surface without a true nipple. In the second type the glands open at the base of an elevated crater, and in the third the region of their opening is elevated to the apex of a cone. To the second type belong the glands of the carnivores and ungulates, and to the third class belong those of marsupials and primates. The number of these glands varies in different kinds of animals and with the number of young produced in a litter. In man two is the normal number, but in a number of cases supernumerary nipples have been recorded both for males and females. Such cases are atavistic and point back to the condition which existed in man's ancestor.

The liver and pancreas are recognized as the largest of the digestive glands, to which group also belong the salivary glands, gastric glands, and intestinal glands. The poison glands of snakes, as modified salivary glands, also belong here. Of vascular glands the kidneys are decidedly the most important, while respiratory glands include the arytenoid and tracheal. Of reproductive glands we find a great variety among both invertebrates and vertebrates, such as the yolk and shell glands, and in mammals the Cowper's and prostate glands.

Any attempt to classify glands according to the substances they produce is unsatisfactory. Thus, if we attempt to separate secreting from excreting glands, we find that, while the kidneys clearly belong in the latter class, the liver belongs to both, though chiefly secretory, and sebaceous glands are also difficult to classify. Perhaps the most obscure organs of this class are the so-called "ductless" glands, the spleen, thyroid, and thymus. They seem to produce some substance of great importance to the well-being of the body; but what it is, and how it affects the organism, are still involved in difficulties. However, as they are all closely associated with the blood system, they may well be called vascular glands.

GLAN'DERS (from *gland*, from Lat. *glans*, acorn). A virulent contagious disease due to the action of a specific microbe, the *Bacillus mallei.* The microbe was discovered in 1882 by Loeffler and Schütz. It is a short, rather stubby rod, with rounded ends. It stains irregularly, occurs singly, in pairs, or in long strings, and grows readily in the ordinary culture media. As a result of natural contagion, glanders is almost entirely confined to the horse, ass, and mule. Cattle enjoy an immunity from it, and sheep and pigs are highly resistant to natural contagion. Dogs, cats, and wild carnivora may become infected by eating the meat of glanderous horses. Glanders has been known since the time of the classic Latin and Greek writers as one of the most dreaded horse diseases. Its distribution is practically universal, though it is said not to occur in Australia.

Glanders appears under several forms with different symptoms. The acute and chronic forms of glanders are universally recognized. The acute form begins with a high fever. The coat is staring, and there are frequent chills. The mucous surfaces are reddened or sometimes yellowish, purulent ulcers appearing on those of the nose. These ulcers rapidly increase in size and depth. Painful swellings occur on various parts of the body, especially in the neighborhood of the lymphatics. In many cases the joints of the legs are affected by acute inflammation. Death generally occurs in from 8 to 30 days. Chronic glanders occurs in the skin form known as farcy, and as true glanders affecting the lungs and other internal organs. In farcy the symptoms begins by the formation of nodules under the skin, known as farcy buttons. The surrounding tissues are broken down, and running ulcers are thus formed. After a variable period these ulcers heal. The disease breaks out again, however, in the same or other locations. The farcy buttons occur most frequently on the neck, shoulders, and inside the thighs.

During the progress of ordinary chronic glanders the lungs are affected by glanderous pneumonia. A lobular V-shaped pneumonia, occurring at the various foci of infection, is characteristic of glanders. Tubercles of sizes varying from that of a millet seed to that of an egg are formed in the lungs, liver, spleen, and occasionally in the kidneys. The tissue of these tubercles breaks down, leaving cavities filled with pus, some of which, in long-standing cases, may ultimately heal.

The symptoms of chronic glanders which are most relied upon by practicing veterinarians for diagnostic purposes are nodular swelling of the submaxillary glands, a dry cough after exercise, farcy buttons on the skin, and a persistent purulent discharge from the nose.

The spread of the disease is due chiefly to the discharges from the nose and from farcy sores. The virus from these sources may contaminate harness, vehicles, fences, stables, water supply, etc., through which other animals are readily infected.

Nearly all the tonics and curative agents known to veterinary medicine have been used in the treatment of glanders, but without result. Medical treatment is of no avail. Spontaneous recovery takes place in rare instances. When the chief symptoms are those of farcy, apparent recovery takes place at intervals, followed by renewed outbreaks of the disease. The nasal symptoms may also cease and later recur. In chronic cases the disease may persist for several years before death occurs.

Glandered animals should be shot and buried or burned. Such procedure is required by law in nearly all countries. Stables and all articles with which glandered horses have come in contact should be disinfected.

For the detection of cases of glanders the symptoms already mentioned are not always sufficient. In latent cases recourse is had to several other means, including injections of mallein. This substance is prepared from the glanders bacillus and contains the glanders toxin, but not the living bacilli. An injection of this substance into healthy horses causes no reaction. In glanderous horses it produces an elevation of temperature, swelling of the submaxillary glands, and trembling, which subsides after a few hours. A rise in body temperature of 2° F. after a mallein injection is considered good evidence of the presence of glanders. Some investigators have reported quite striking curative effects from the continued use of large doses of mallein. Several reliable methods of serum diagnosis are now available for use, including the serum agglutination and precipitation reactions and the complement fixation test. The complement fixation test is considered to be the most satisfactory single method of diagnosing glanders.

Glanders in Man, otherwise called EQUINIA. Man may acquire the disease by accidental inoculation from the horse, though several cases have been recorded in which glanders has been transmitted from one human being to another. The symptoms of acute glanders in man are: weakness, chills, muscular and articular pains, the appearance of nodules with swelling and redness, rise of temperature, and suppuration. A single ulcer may cause great swelling of the whole hand and arm, with œdema, enlarged glands in armpits, and subsequent ulcers and pustules upon the swollen surface. A discharge from the nasal cavities appears, watery and viscid at first, afterward purulent and very offensive. The nose becomes swollen and painful, and perforations of the cartilage occur. The mouth becomes dry, dark red, and thickly coated; constipation is followed by diarrhœa; intense nervousness or delirium may follow; albumin appears in the urine. Emaciation and prostration are followed by death in the fourth week, in fatal cases. Besides the acute form just described, there is also a chronic form of glanders in man, but this occurs very rarely. Consult: J. Law, *Text-Book of Veterinary Medicine,* vol. iv (Ithaca, 1905–11); Hutyra and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals,* vol. i (New York, 1913); E. W. Hoare, *A System of Veterinary Medicine,* vol. i (ib., 1913); Mohler and Eichhorn, "The Diagnosis of Glanders by Complement Fixation," *United States Department of Agriculture, Bureau of Animal Industry Bulletin 136* (1911); id., "Various Methods for the Diagnosis of Glanders," *United States Department of Agriculture, Bureau of Animal Industry Circular 191* (1912).

GLANDI'NA (Neo-Lat., from Lat. *glans,* acorn). A genus of large pulmonate mollusks, or land shells, of the shell-bearing slug family Testacellidæ. It includes about 125 species, whose shells are somewhat fusiform in shape, smooth, polished, and beautifully colored and marked. They creep about among the herbage and on bushes and are voracious feeders upon other smaller snails and all sorts of animal matter. Most of them belong to the American tropics, but one, at least, is European. Several species enter the southern border of the United States, of which the best known is the rose-tinted extremely variable *Glandina truncata,* which is illustrated on the Colored Plate of NORTH AMERICAN SNAILS, accompanying the article SNAIL.

GLANDS, DISEASES OF THE. The lymphatic glands are subject to enlargement from acute inflammation and abscess, usually in consequence of irritation of the part from which their lymphatics spring, as in the case of scarlet fever and diphtheria (qq.v.), in which the glands of the throat are affected; or in the case of gonorrhœa (q.v.), in which the glands of the groins are affected; in bubonic plague, in which the glands of the groins, armpits, or neck, etc., may be involved. The treatment of such abscesses is purely surgical. A much more troublesome affection of the glands is the slow, comparatively painless, at first dense, solid swelling which they undergo in scrofula (q.v.), which tends very slowly, if at all, to suppuration and sometimes remains for years. In syphilis (q.v.) and cancer there are also enlargements of the lymphatic glands. Scrofulous or tubercular diseases of the mesenteric glands in children constitute *tabes mesenterica.* (See Mesentery.) The larger glands, as the liver, kidney, pancreas, spleen, thyroid, thymus, testicle, and even the pituitary gland, have all their special diseases, which are noticed under the names of these organs.

Glandular fever is a disease of childhood, probably of infectious origin, and characterized by a sudden onset, moderate fever, and swelling of the glands of the neck, and sometimes those of the axilla and groin. The disease is not dangerous, but complications, the most serious of which is nephritis, may lend gravity to the case. Isolation, mild purgation, rest, and symptomatic remedies are indicated in the treatment.

GLANEUSES, glȧ′nẽz′, Les (Fr., The Gleaners). A celebrated painting by Jean François Millet (1857) in the Louvre, representing a field in which three women are picking up the forgotten stalks, while the laborers are seen with loaded wagons in the background. The picture is remarkable for its effects of light and is considered one of Millet's best works. For illustration, see Millet, Jean François.

GLAN′VILL. The putative author of the first classical textbook of the English common law. This work, *A Treatise on the Laws and Customs of England* (*Tractatus de Legibus et Consuetudinibus Angliæ*), appears from internal evidence to have been composed towards the close of the twelfth century and in the last years of the reign of Henry II. The Glanvill whose name it bears is doubtless the celebrated Ranulph de Glanvill, Chief Justiciar and Prime Minister of Henry, one of the conspicuous figures of that stormy period of English history. He came of a Suffolk family of position, was sheriff of Yorkshire from 1163 to 1170, and in 1174, when sheriff of Lancashire, led the forces of the King against the invading Scots and won a great victory. Thereafter his place was at the right hand of the King as trusted adviser, ambassador, prime minister, and justiciar. He died at Acre in 1290, to which place he had gone with Richard I on his crusade to the Holy Land.

But there is no trustworthy evidence that Ranulph de Glanvill wrote the law book attributed to him. It is more likely to have been the work of some learned clerk at his court, perhaps of his secretary and kinsman, Hubert Walter, and that the title of the work is a dedication rather than an attribution. But there can be no doubt that it represents the law of Glanvill's time and is a correct picture of the legal system which he was engaged in shaping. Though the writer must have had some knowledge of the canon law, his work is English both in matter and arrangement. That is to say, it is not "institutional" and scientific in form, but empirical and practical. It sets forth the procedure of the King's Court, the *Curia Regis*, the various pleas which it will entertain, the several classes of wrongs which it will remedy, and the plea appropriate to each, and so considers the substantive law, both civil and criminal, after the usual common-law method, from the standpoint of procedure. It immediately took high rank as a legal authority and retained its unquestioned supremacy until superseded, 60 or 70 years later, by Bracton's great work. In the meantime many editions, as we should call them, by various annotators, appeared, and many of these manuscripts are still in existence. A Scottish version, known as the *Regiam Majestatem*, long passed as an original treatise.

Glanvill was first printed in the year 1554 at the instance of Sir W. Stanford, a judge of the Court of Common Pleas. It was early translated into French, and an English version by Beames appeared in 1812. A new edition of Beames's translation has recently appeared under the careful editorship of Prof. Joseph H. Beale, Jr. (Washington, 1900).

GLANVILL, Joseph (1636–80). An English divine, born at Plymouth. He graduated at Exeter College, Oxford, in 1655, took the degree of M.A. at Lincoln College in 1658, and became chaplain to Francis Rous, provost of Eton. After the Restoration he conformed, and in 1660 became rector at Wimbish, Essex, by appointment of his brother, a prominent London merchant. He became a friend of Henry More, but was not himself a Platonist, and was one of the early fellows of the Royal Society. His first and best-known work, *The Vanity of Dogmatizing* (1661), an attack on the scholasticism of the Oxford school, anticipates Hume's theory of causation and foreshadows the electric telegraph in the words: "to confer at the distance of the Indies by sympathetick contrivances may be as natural to future times as to us is a literary correspondence." It contains the story of the "Scholar Gypsy" from which Matthew Arnold obtained the basis for his poem. Glanvill was appointed rector of the Abbey Church at Bath in 1666, and chaplain in ordinary to Charles II in 1672. During the "Popish Plot" excitement he wrote a spirited attack on the nonconformist sects, *The Zealous and Impartial Protestant* (published in 1681). Among his voluminous works, written in a rather rhetorical style, are: *Lux Orientalis* (1662), a defense of More's doctrine of the preëxistence of souls; *Scepsis Scientifica: or Confest Ignorance the Way to Science* (1665; reprinted 1885), a revision of his first work, in which, as in *Philosophical Considerations Touching Witches and Witchcraft* (1666) and *Sadducismus Triumphatus* (1681), he collected evidence on superstitions and conducted psychical research; *Plus Ultra, or the Progress and Advancement of Knowledge Since the Days of Aristotle* (1668), a defense of the Royal Society; *The Ways of Happiness* (1670); *An Earnest Invitation to the Lord's Supper* (1673); *Essays on Several Important Subjects* (1676), containing his remarkable "Anti-Fanatick Theologie and Free Philosophy," in continuation of Bacon's *New Atlantis; An Essay Concerning Preaching* (1678).

GLANVILLE, Bartholomew de. See Bartholomæus Anglicus.

GLAP′THORNE, Henry. An English dramatist, of whose life nothing is known except that he was a friend of Cotton and Lovelace and an adherent of the court, and wrote most between the years 1639 and 1643. His works consist of: *Albertus Wallenstein* (1639), an historical drama; *Argalus and Parthenia* (1639), a dramatization in verse of a part of Sidney's *Arcadia; The Hollander* (1640); *Wit in a Constable* (1640); and *The Ladies' Privilege* (1640). Other plays have been credited to him; Bullen and Fleay both reprint *The Lady Mother* as his work, and Schelling attributes it to him. He wrote a volume of *Poems* (1639) and a poem called

Whitehall (1643). His works may be characterized as indifferent and feeble, with occasional bursts of beauty. Consult the memoir in the collected edition of his *Plays and Poems* (London, 1874); an essay in *Retrospective Review*, vol. x (ib., 1824); and Ward, *English Dramatic Literature*, vol. iii (ib., 1899).

GLAREANUS, glä′rȧ-ä′nụs, Henricus (1488–1563). A Swiss humanist and musical theorist, whose name was Heinrich Loriti. He was born at Mollis, Canton of Glarus (whence his name). He studied music under Cochläus at Cologne, where he also gave considerable attention to philosophy and theology. At the age of 24 he became poet laureate to Emperor Maximilian I. He taught mathematics at Basel from 1515 to 1517, when his friend Erasmus is said to have secured for him an appointment to the chair of philosophy at Paris. At first a defender of Reuchlin and a follower of the Reformation, he is believed subsequently to have changed his views and to have removed to Basel, accepting a professorship at the university in that city about 1529, whence he afterward removed to Freiburg. Biographical details concerning him are somewhat meagre and unreliable; more is known of his work. One of his principal publications is entitled *Isagoge in Musicen Henrici Glareani, etc.* (1516), the first work published by him, and treating of solmization, the intervals, tones, and modes. His *Dodekachordon* (1547) is still of great value to the historian and student of music, inasmuch as here for the first time the theory is enunciated that there should be 12, instead of 8, church modes, corresponding to those of ancient Greece. The work is divided into three parts and is furnished with numerous examples from the works of Ockenheim, Josquin de Prês, and other famous composers of the fifteenth and sixteenth centuries. Consult O. F. Fritzsche, *Henricus Glareanus* (Frauenfeld, 1890).

GLARUS, glä′rụs. A canton of Switzerland, bounded by the Canton of St. Gall on the north and east, Grisons on the south, and Uri and Schwyz on the west (Map: Switzerland, D 1). Area, 267 square miles. The centre is taken up by a valley open on the north and inclosed on the east, south, and west by snow-capped mountains, most of them exceeding 10,000 feet in height. The chief river is the Linth, flowing into the Wallensee. Agriculture is of secondary importance, domestic products not sufficing to meet the home demand. The chief manufactured products are cotton, woolen, and silk goods, and beer. The canton is well provided with transportation facilities and carries on a considerable trade in textiles.

The form of government is thoroughly democratic. The people exercise their legislative power directly, assembling for that purpose once a year in the Landesgemeinde. The executive power is vested in a council of seven members elected by the Landesgemeinde for three years. The rural communities are administered by communal councils. Pop., 1900, 32,349; 1910, 33,316. The inhabitants are mostly Protestant and speak German. Capital, Glarus (q.v.).

GLARUS. The capital of the Swiss canton of the same name, situated on the Linth, 43 miles by rail from Zurich (Map: Switzerland, D 1). The chief buildings are the Gothic church, used in common by Roman Catholics and Protestants, and the government buildings, containing a natural history museum and an art collection. The town is lighted by gas and electricity, and has water works. There are cotton-printing mills, bleacheries, cigar factories, and breweries. The commerce is of considerable importance. Pop., including the suburbs, 1900, 4940; 1910, 4877, mostly German-speaking Protestants.

GLAS, John (1695–1773). Founder of the Glassites, or Sandemanians. He was born at Auchtermuchty, Fifeshire, Scotland. He studied at St. Andrews and Edinburgh, entered the ministry, and became a popular preacher. In his *Testimony of the King of Martyrs* (1727) he maintained that all national establishments of religion and all interference of the civil authority in religious affairs are inconsistent with the true nature of the Church of Christ and was thus probably the first to assert the voluntary principle in Scotland. For advocating such views he was first suspended and later deposed from the ministry (1730). He then formed an independent congregation in Dundee and in 1733 removed to Perth, where he built his first church. He was here joined by Robert Sandeman, who married his daughter and became the better-known leader of his followers in England and America. He died at Perth, Nov. 2, 1773. Notwithstanding some intellectual eccentricities, Glas was a man of strong character and sound scholarship. His works were published at Edinburgh in 1761 and at Perth in 1782–83. The thirteenth edition of his *Christian Songs* appeared at Perth in 1847. See Sandeman, Robert; Sandemanians.

GLASENAPP, glä′ze-nȧp, Karl Friedrich (1847–1915). A German philologist and writer on music. He was born at Riga, studied comparative philology at Dorpat, and in 1875 became professor of German literature at Riga. His principal work, *Richard Wagners Leben und Wirken*, is the most comprehensive biography of the master. The first volume appeared in 1876, the last (sixth) not until 1913. Two other important works are *Wagner-Lexicon* (1883) and *Wagner-Encyclopädie* (1891). Beginning with their foundation he was a frequent contributor to the *Bayreuther Blätter*. He also published some of Wagner's correspondence and wrote a life of Siegfried Wagner (1906).

GLASER, glä′zẽr, Adolf (1829–). A German author, born at Wiesbaden. For more than 22 years (1856–78) he continuously conducted *Westermann's Illustrierte Monatshefte* and he again was associated with that publication after 1882. His first success was the novel *Schlitzwang* (2d ed., 1879), which was followed by a series of historical novels, such as *Savonarola* (1883) and *Wulfhilde* (1885). His principal dramas are also chiefly historic: as *Galileo Galilei* (1861). He is favorably known as a translator of Dutch novels. His collected works were published in 12 volumes, 1889–92.

GLASER, Eduard (1855–1908). An Austrian explorer, born at Deutsch-Rust, Bohemia. He studied physics, geology, and astronomy at Vienna and Prague, and afterward devoted himself to the study of Oriental languages, visiting Egypt and Tunis. In 1882 he observed a total eclipse of the sun at Sohag, Upper Egypt, and subsequently he made a trip to southern Arabia (Yemen, especially Jauf and Mârib). In 1885 and thereafter he again made several tours through Arabia, and collected nearly 2000 manuscripts and numerous archæological specimens, relics chiefly of the city of Mârib, the capital of the ancient Sabæan kingdom; most of these are in the Imperial Library, Vienna. Glaser's researches on the topography of Arabia, and on the epigraphy and dialects of the southern portion of the peninsula, are highly important. Besides contributions to scientific periodicals he wrote: *Mitteilungen über einige aus meiner Sammlung stammende sabäische Inschriften* (1886); *Skizze der Geschichte und Geographie Arabiens von den ältesten Zeiten bis zum Propheten Muhammad* (1889 et seq.); *Die Abessinier in Arabien und Afrika* (1895).

GLASER, glä′zẽr, JULIUS ANTON (originally JOSUA) (1831–85). An Austrian jurist and statesman. He was born at Postelberg, Bohemia, of Jewish parents, and was educated at Vienna and Zurich. In 1856 he was appointed professor in the University of Vienna. In 1871 he was elected to the Diet of Lower Austria, and from 1873 to 1879 he was a member of the Austrian Reichsrat. In 1871–79 he was Minister of Justice in the Auersperg cabinet, and subsequently was procurator general at the Court of Cassation, Vienna. He was one of the foremost jurists of his day, and aided greatly in the reformation of criminal jurisprudence in Austria. His principal publications are: *Das englische-schottische Strafverfahren* (1850); *Die Fragstellung im Schwurgerichtsverfahren* (1863); *Zur Juryfrage* (1864; republished with the preceding work in 1879, under the title *Schwurgerichtliche Erörterungen*); *Anklage, Wahrspruch und Rechtsmittel im englischen Schwurgerichtsverfahren* (1866); *Gesammelte kleinere Schriften über Strafrecht, Civil- und Strafprozess* (2d ed., 1883); *Sammlung strafrechtlicher Entscheidungen des k. k. Obersten Gerichtshofs* (3 vols., 1872). Consult the sketch by Unger (Vienna, 1888).

GLASER, OTTO C(HARLES) (1880–). An American zoölogist. He was born at Wiesbaden, Germany, and graduated in 1900 from Johns Hopkins University, where he received his doctorate in philosophy in 1904. He was an assistant in the United States Bureau of Fisheries and the North Carolina Geological Survey (1901–02), marine biologist of the Gulf Biological station (1903), demonstrator at the College of Physicians and Surgeons, Baltimore (1901–03), and taught biology at Woods Hole, Mass., in 1905–07, and at the University of Michigan after 1905, becoming assistant professor in 1908. His researches comprise investigations on the behavior of the white rat, behavior of the *Ophiura*, oyster culture, origin and physiology of nematocysts, cytology and embryology of *Fasciolaria*, and developmental energetics.

GLASGOW, glȧs′gō̇ *or* glȧs′kō̇. A royal and parliamentary burgh, the industrial and maritime metropolis and the largest city of Scotland; after London and Birmingham, the largest city in the United Kingdom (Map: Scotland D 4). It is situated on the river Clyde, in the lower ward of Lanarkshire, and occupies chiefly the north side of the river, but has large and populous suburbs on the south side. The river is crossed by several bridges. Two of granite and one of iron are much admired for their light and graceful architecture. Two are suspension bridges and three are railway bridges. Below the bridges, ferryboats ply at all hours.

Glasgow is built for the most part on level ground, but in the north and northwest districts there are considerable elevations. Owing to the great number of factories and mills of all kinds, the city has a somewhat dingy and smoky aspect; in other respects it has many attractions. The houses facing the river stand well back, leaving spacious thoroughfares on each side which afford full and noble views of the bridges, of several handsome street ranges and public buildings, and of the harbor with its funnels and forests of masts. Most of the leading streets run from east to west, parallel with the river, and almost all the streets, except in the oldest parts of the city, are laid in straight lines. The houses are generally lofty, and built of freestone, the floors of each tenement being usually occupied by separate families, entering by a common stair. In the fashionable quarters elegant residences prevail. The city may be divided into the eastern and western sections, separated by Buchanan Street; the former contains all that there is of antiquarian interest and many of the modern public buildings, while the latter is the more modern and fashionable quarter. The principal business streets are Argyll, running parallel to the river; Buchanan, running at right angles; and Sauchiehall, the main thoroughfare to the west-end residential section. George Square, the centre of the city, is adorned with an 80-foot fluted column surmounted by a statue of Sir Walter Scott, equestrian statues of Queen Victoria and the Prince Consort, and statues of Sir John Moore, James Watt, Sir Robert Peel, William Pitt, Thomas Campbell, Robert Burns, David Livingstone, Lord Clyde (Sir Colin Campbell), and Gladstone. About this square are clustered some of the most notable buildings in the city, such as the municipal buildings (in Venetian Renaissance style, opened in 1889), Merchants' House, Bank of Scotland, and the General Post Office. Among other public buildings are the Royal Exchange in Queen Street, in the Corinthian style, in front of which stands a colossal equestrian statue of the Duke of Wellington; the magnificent buildings of the university, erected in Early English style on Gilmore Hill and opened in 1870; the Institute of Fine Arts and the Corporation Art Gallery, both in Sauchiehall Street (the art gallery and museum are now housed in Kelvingrove Park). The cathedral, dedicated in 1197 and completed about the middle of the fifteenth century, was designed in the form of a cross, but the transepts were never completed. It is Early English in style, and is particularly noted for its beautifully proportioned and elaborately decorated crypt. The principal cemetery is the Necropolis, on a hill in the northern part of the city; here is a conspicuous Doric column erected (1824) in memory of John Knox.

Glasgow owes its industrial and commercial importance to its advantageous situation in the midst of a district abounding in coal and iron. Much of its prosperity is due also to its position near the mouth of the Clyde and the possession of a splendid harbor (206 acres). Over $40,000,000 has been expended in the widening and deepening of the river, which is now navigable by vessels drawing 26 feet of water. In 1912 the total net tonnage entered and cleared, excluding coastwise vessels, was 5,226,000. In 1900 imports and exports of merchandise were valued at $68,309,527 and $90,006,810 respectively; in 1910, $70,777,317 and $143,961,057; in 1912, $82,506,000 and $162,817,725. The chief articles of export are woolen, cotton, and linen goods, machinery, millwork, and metal manufactures, coal, paper, chemicals, and whisky. The imports include largely raw products, such as wheat, corn, flour, sugar, wool, metal (especially iron) ores, timber, tobacco, and petroleum. The city is the chief centre of the shipbuilding industry of the world; the building of all kinds of machinery is next in importance, followed by cotton spinning and weaving. Calico printing, dyeing, and distilling and brewing should be mentioned. The famous St. Rollox Chemical Works, one of the largest of its kind in the world, has a chimney stack 435 feet high, a conspicuous landmark of the city. Loch Katrine, 42 miles distant and 364 feet above sea level, furnishes the water supply of Glasgow.

The government of the city is administered by a corporation consisting of 77 members, including the lord provost and 14 bailies. See paragraph on *Local Government* under GREAT BRITAIN.

Glasgow has led in the work of municipal reform in Great Britain. Its various improvements and great undertakings have been carried out by the corporation, which, under an act of Parliament, constituted itself in each case as a "trust," such as the Improvement Trust, the Police Trust, the Market Trust, the Navigation Trust, etc. For the purposes of practical work, the various trusts, i.e., the corporation in its several capacities, elect subcommittees, which have immediate supervision of the respective departments of city administration. Thus, the Sanitary Department, or Board of Health, is under the supervision of a corporation committee with subcommittees on cleansing and hospitals. It is administered by a chief inspector, assisted by some 150 inspectors, the work of each being highly specialized. The thorough organization of the Board of Health and the numerous other improvements of the city were necessitated by the extreme density of the population, and the consequent high rate of mortality among the working people. In 1865, the year marking the beginnings of the various public undertakings, the density of the population was very great—1000 per acre in certain districts. The average mortality in 1864 was 32.8 per thousand, and as high as 38.64 for a series of preceding years. The Improvement Trust, in cutting wide streets as well as in laying out new ones, in demolishing old buildings and creating vacant space, and in a good many other ways, helped to disperse the population over a wider area. In 1891 the boundaries of the city were extended; before extension, the average density was 92.5 to the acre, and after extension 55.5; in 1901, about 60 to the acre; in 1911, 62. Still, at the present day, a vast number of families occupy single-room dwellings (in 1911 there were 32,606 one-room dwellings and 75,536 two-room, out of a total of 163,057). The death rate has fallen to about 20. The birth rate averages about 33.

In addition to its work of prevention of disease, the Sanitary Department pays due attention to combating prevailing disease. Its two great municipal hospitals not only are models in appointment, but are built in a very attractive manner. Special buildings are provided for infectious diseases. The sanitary washhouses are used for disinfecting the belongings of families whose members are afflicted with contagious diseases, the families themselves being entertained at the cost of the city in its "house of reception" while their homes go through the process of disinfection and whitewashing. The Cleansing Department probably contributes as much to the health of Glasgow as the Sanitary Department. In addition to the usual sweeping and sprinkling of public streets, this department attends to the cleansing of private courtyards and passageways, the owners being assessed a slight tax to cover the expense. The street sweeping is done by machines at night. The litter swept up by men and boys during the day is deposited in covered iron bins, located under the surface of the streets at short intervals. There are three principal "dispatch stations," together with a number of minor ones, at which the city garbage undergoes a treatment which converts the greater part of it into manure. The city owns a number of farms for the utilization of that part of the refuse which cannot be marketed. To avoid contamination of the waters of the Clyde, the city's sewage is treated chemically in a special sewage plant, where it is made to precipitate all its solid ingredients, which are then made into "cakes" by powerful presses, and passed automatically into freight cars standing on the tracks below. Most of the cakes are utilized at the city's farm for raising fodder for the horses employed in the Cleansing and Street Railway departments. The water remaining after the precipitation of the solid ingredients is filtered, and passed entirely pure into the Clyde. All of these improvements, though originally involving a considerable outlay of capital, have more than paid for themselves.

The Glasgow police consists mostly of Highlanders, who are universally praised for their intelligence and efficiency. The police courts constitute a part of the police department. Justice is administered by the Lord Provost and the bailies. Half of the expense of the department is met by the general government.

The city possesses considerable and profitable real estate. There are some two dozen municipal tenements, which, though superior to the private houses of the same class, are built largely in undesirable localities, and thus utilize land which could not be disposed of otherwise.

The Glasgow municipal lodging houses are models in their line, and a boon to the poor. Although the charge is only seven to nine cents per night, they yield a revenue above all expenses, including interest. In 1896 the municipal family home was opened to accommodate families of widows or widowers who are obliged to be away from their children during the day. It contains all the necessary accommodations, including playrooms, playgrounds, and a nursery. There are nurses to take care of the children while their parents are at work. The charges are: for mother with one child, 76 cents per week; mother with two children, 92 cents. Board: breakfast, five cents; dinner, eight cents; tea, six cents. The public baths comprise five large establishments containing swimming pools, and accommodating on the average 1500 people per day. The public washhouses are fitted out with steam boiling apparatus, centrifugal machine driers, hot-air apartments, steam-operated roller mangles, etc. The charge for their use is four cents per hour.

The public lighting is done by the city. After having taken over the gas plant, the city went on improving it, at the same time reducing the cost of gas to consumers. Between 1869 and 1891 the population increased less than 30 per cent, and the consumption of gas increased 170 per cent. From $1.14 per 1000 feet in 1869, the price has gradually been reduced to 60 cents, without diminishing the net profits. In 1893 the city opened a large electric plant which has proved a great success, and lights not only streets and public buildings, but also private courts and stairways.

The water supply is under the management of the Board of Water Commissioners. In 1860 a new supply of water was introduced from Loch Katrine by means of a large reservoir covering an area of 86¼ acres, at a distance of 7 miles from the city and 300 feet above its general level. Subsequently the water supply was greatly augmented in part by raising the level of Loch Katrine 5 feet. With a steadily diminishing water rate the city has been able to meet not only all the expenses, including interest, but also to accumulate a sinking fund.

In 1894 the city took over the street-car system; by the terms of the original contract it did not have to pay for the plant, but received from the company a total sum of $225,000 in rental money, and exacted another sum known as the renewal fund to keep the system in repair. Since then a new set of commodious cars has been introduced, certain extensions have been made, and the horse-car service has been replaced by a modern electric-traction system, all completed by the summer of 1901. After carrying out all of the improvements and charging the low rate of one cent for short rides and two cents for long ones, and after having reduced the hours of its employees from 14 (under the rule of the company) to 10, and advanced their wages, the city not only has managed to pay all expenses, including depreciation and interest on capital, but lays aside annually about $300,000 in the sinking and general reserve fund.

Glasgow possesses a system of municipal markets, used, however, for wholesale transactions only. All slaughtering is done in the municipal abattoirs, yielding an income to the city. Under the name of the Clyde Navigation Trust, the city operates the harbor ferries, and holds a monopoly of all harbor services. The Mitchell Library, with 175,000 volumes, though founded by private persons, serves the purposes of a public library, and receives a grant from the city. In addition, the city has several minor libraries.

The schools are managed very successfully by the Glasgow School Board, as may be seen from the increasing attendance in public schools and the diminishing numbers in private ones. A system of fees divides the schools into three distinct classes, each aiming to furnish the same kind of education, but serving to separate the children of the rich from those of the poor. There are a number of technical schools, governed by a board of trustees, on which the Glasgow University is also represented. In addition to the University (see GLASGOW UNIVERSITY), there are the Glasgow and West of Scotland Technical College, St. Mungo's College, Anderson College, St. Margaret's College for Women, and the United Free Church College. The secondary schools include the High School, Glasgow and Kelvinside academies, and the Hutcheson Trust schools. There are numerous hospitals and dispensaries, and three large, excellently appointed general infirmaries. Glasgow has a number of theatres and large concert halls. The Royal Botanic Gardens near the Western Infirmary, with their large conservatories and fine collections of exotic and other plants, form a favorite resort for the citizens. Other large parks include the Glasgow Green (140 acres) on the Clyde, Kelvingrove Park, in the west end, Queen's Park (130 acres) on the south side, and Alexandra Park (120 acres). Glasgow is the seat of a United States consul.

The population of Glasgow in 1801 was 77,385; in 1821, 147,043; in 1861, 395,503; in 1881, 511,415; 1891, 565,839. The city limits were extended in 1891, the population becoming 658,198. In 1901 Glasgow had 761,742 inhabitants, and the area of the city was 12,561 acres; in 1911, 784,496 inhabitants, the area being 12,669 acres. The 1901 population of the 1911 area was 775,594, so that in the decade the increase on the same area was 8902; the natural increase is calculated at 91,540, showing a loss by migration of 82,638. Of Glasgow's area, 12,490 acres are reckoned as of Lanarkshire and 179 acres Renfrewshire. There are important suburbs, including the conterminous burghs of Govan (1303 acres, pop., 89,605) and Partick (956 acres, pop., 66,849), and, in Dumbartonshire, the burgh of Clydebank (1330 acres, pop., 37,548).

Glasgow traces its beginnings in tradition to the little wooden church which St. Kentigern, apostle to the Scots, built on the banks of the Molendivar about 560 A.D. Nothing is known of the town for more than five hundred years, till David, Prince of Cumbria, the future King David I, in 1116, reëstablished the see of Glasgow and rebuilt its church. Between 1175 and 1178 Glasgow was made a burgh, subject to its bishop, whose bailie and provosts administered its affairs. In 1300 Wallace defeated the English there, and five years later he was also betrayed to the English there. In 1450 it was made a regality; in 1611 it gained by charter the right of electing its magistrates, and in 1636 became a free royal burgh. Its university, modeled on that of Bologna, was founded by a papal bull in 1451. In the seventeenth century the town was a stronghold of Whiggism and the Reformed religion. The great commercial growth of Glasgow dates from the union with England in 1707. Enjoying equal freedom of trade with English ports, it quickly obtained a large share of the American trade, for which its position on the west coast fitted it especially. Glasgow became the chief emporium of the tobacco trade, and its Virginian merchants formed a local aristocracy remarkable for wealth and distinction. This trade was at length paralyzed by the American war; but sugar cultivation in the West Indies and the introduction of cotton manufacture opened up new paths to wealth. It was here that Watt invented his steam engine. To-day it is the centre of huge shipbuilding yards and numerous branches of the iron industry.

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A British City: The Beginnings of Democracy (New York, 1907); Marwick, *Early Glasgow* (Glasgow, 1911); Primrose, *Mediæval Glasgow* (ib., 1913).

GLASGOW. A city and the county seat of Barren Co., Ky., about 100 miles (direct) south of Louisville, on the Louisville and Nashville Railroad (Map: Kentucky, E 6). It has the Liberty Female College. The city is in the oil region of the State; carries on a considerable trade in lumber, cattle, mules, and livestock; and its industrial establishments include lumber mills, large tobacco warehouses, handle factories, furniture and tobacco factories, etc. Pop., 1900, 2019; 1910, 2316.

GLASGOW, Ellen Anderson Gholson (1874–). An American novelist, especially interesting in her studies of Southern scenes and people, and not least in her pictures of the change in the South from the old order to the new. She was born at Richmond, Va., and was educated privately. Her works include: *The Descendant* (1897); *Phases of an Inferior Planet* (1898); *The Voice of the People* (1900–02); *The Freeman and Other Poems* (1902); *The Battle-Ground* (1902); *The Deliverance* (1904); *The Wheel of Life* (1906); *Ancient Law* (1908); *The Romance of a Plain Man* (1909); *The Miller of Old Church* (1911); *Virginia* (1913).

GLASGOW UNIVERSITY. One of the great seats of learning in Scotland. It was founded in 1451 by Bishop Turnbull, its foundation being ratified by a papal bull of Nicholas V. In 1460 James, first Lord Hamilton, bequeathed a tenement and four acres of ground to the Regents of the "Pædagogium," or college of arts, and the university was further endowed by Queen Mary, as well as by her son, James VI of Scotland, better known as James I of England, who issued a new charter to the institution. The chief prosperity of the university, however, dates from the middle of the nineteenth century. In 1864 the university buildings and adjacent lands were sold, and splendid new buildings were erected on a site overlooking the Kelvin River, at a cost of about £470,000. These were opened in 1870 and have been extensively added to since 1892. By acts of Parliament, in 1858 and 1889, the university has been entirely reorganized and is now a corporation consisting of a chancellor, rector, dean of faculties, principal, professors, and students. The university court consists of the rector, the principal, the Lord Provost of Glasgow, and various assessors, representing both city and university. The body administers the property of the institution, appoints and regulates professors, and acts as court of appeal from the senate, which consists of the principal and professors, and regulates teaching and discipline. The general council, consisting of various ex officio members and all masters and doctors, meets twice a year to revise the business of the university. It elects the chancellor, four assessors to the court, and, with the general council of Aberdeen University, returns one member to Parliament. The chancellor in 1914 was the Earl of Rosebery. There is also a students' representative council. The chancellor holds office for life; the rector, generally some man distinguished in politics or letters, is chosen triennially by the students. The duties of the latter are wholly honorary. The students retain many of the customs and rights of mediæval universities, of which the election of the rector is one. They are still divided into four "nations"—Glottiana (Lanarkshire), Transforthana (Scotland north of the Forth), Rothseiana (Bute, Renfrew; and Ayr), and Loudoniana (all others). In 1913 the number of students was 2770, including some 700 women. Women were first admitted in 1893 and Queen Margaret College was then handed over to the university by its trustees for their use. In 1913 the instructors numbered 164. In 1914 the rector was the Right Hon. A. Birrell, M.P. President Poincaré was chosen rector for 1915 by the student body.

The university grants degrees in arts, science, medicine and surgery, divinity, and law. It has a library of 210,000 volumes, an observatory, a botanical garden, besides many special collections of books, apparatus, and the great Hunterian collection of coins, medals, and anatomical preparations. An important feature of the university is the number of scholarships, exhibitions, and fellowships in its gift, among which the Snell exhibitions are the oldest and richest.

The University of Glasgow is rich in the number of distinguished graduates and teachers. Among them may be mentioned Bishop William Elphinstone, John Major, John Spottiswoode, Andrew Melville, James Melville, Robert Boyd, of Trochrigg, John Cameron, Zachary Boyd, Robert Baillie, James Dalrymple, first Viscount Stair, Gilbert Burnet (Bishop of Salisbury), John Douglas (Bishop of Salisbury), Dr. Robert Simson, Francis Hutcheson, Dr. William Hunter, Dr. James Moor, Adam Smith, Dr. Thomas Reid, Dr. William Cullen, Dr. Joseph Black, Dr. Matthew Baillie, Prof. John Miller, Thomas Thomson, Francis Jeffrey, J. G. Lockhart, Sir William Hamilton, Archbishop Tait, Prof. R. C. Jebb, Lord Kelvin, and Sir Joseph Lister. The four hundred and fiftieth anniversary of the foundation of Glasgow University was celebrated in 1901, and in the various publications of that celebration is to be found much valuable information regarding the institution. Consult also: Stewart, *The University of Glasgow* (Glasgow, 1891); Coutts, *A History of the University of Glasgow from its Foundation in 1451 to 1909* (ib., 1909); and the *Glasgow University Calendar*.

GLASH'AN, John Cadenhead (1844–). A Canadian educator and mathematician. He was born at Ellon, Aberdeenshire, Scotland, and was brought by his parents to Upper Canada (Ontario) when nine years old. He was educated at the public schools, at the provincial normal school, and at Toronto University. In 1864 he became a teacher in the Provincial Model School, Toronto, and in 1871 and 1876 respectively was appointed inspector of schools for Middlesex County and for the city of Ottawa, continuing in the latter office until 1910. In 1895 he was made a member of the board of civil-service examiners. In 1902 he was elected a fellow of the Royal Society of Canada. He contributed articles on mathematical subjects to various journals and devoted special attention to the history of mathematics. He is the author of an arithmetic for public schools, an advanced arithmetic for high schools, and also, with G. A. Wentworth and J. A. McLellan, of *Algebraic Analysis* (1889).

GLAS'PELL, Susan (Mrs. George Cram Cook) (1882–). An American author, born at Davenport, Iowa. She graduated from Drake University and also studied at the University of Chicago. For a time she was State House and legislative reporter for the *News* and the *Capital*, daily newspapers of Des Moines, Iowa. She married George Cram Cook in 1913. Besides her contributions to magazines, she is author of *The Glory of the Conquered* (1909), *The Visioning* (1911), and *Lifted Masks* (1912) —novels that are intensely emotional and distinguished by their vivid realism and imaginative power.

GLASS (from AS. *glæs*, Icel., OHG. *glas*, Ger. *Glas;* connected with Icel. *gler*, AS. *glær*, amber, and ultimately with Eng. *glare*). The use of glass came to the West from the East, and for that reason there is a diversity of names among the Indo-European nations. In Greek the usual word is *ὕαλος*, *hyalos*, of which the etymology is uncertain. In Latin the word is *vitrum*, which also means *woad*, used for its blue dye—a fact which suggests that the earliest glass known to the Romans was in the form of blue beads. Among the northern peoples the original name of the amber (OHG. *glas*) was transferred to the new material and has given rise to the English *glass*. The French (*verre*) and most of the other Romance languages have kept the Latin name.

The manufacture of glass was known to the Egyptians at a very early date. Tombs of the fourth and fifth dynasties (c.4000 B.C.) show glass blowers at work, and glazed pottery in the form of beads occurs in prehistoric times, though true glass first appears later in the form of opaque "paste" and finally as transparent glass. The oldest example of dark-blue glass is a pendant found at Naqada, which seems to date from the seventh dynasty, though no other specimens of this manufacture are known before the eighteenth dynasty. A wall painting of the eleventh dynasty, at Beni Hassan, is commonly interpreted as representing accurately the processes of glass blowing, but Dr. Flinders Petrie believes that some metallurgical process is depicted in which reeds tipped with lumps of clay were used. The fullest information about the processes and materials used by the Egyptians is furnished by the discovery of the glassworks at Tell el-Amarna, belonging to the eighteenth dynasty. Here were found fritting pans in which the first melting of the substances took place and also many imperfectly fused frits. The ingredients used were silica, lime, alkalies, and copper carbonate; but the exact proportions needed to secure a given color do not seem to have been known, and the exact tint produced must have been largely a matter of chance. They did know, however, that river sand, from the presence of iron, gave a green tinge, and to avoid this used crushed quartz pebbles. After the mixture had been fused until the colors began to appear, it was formed into cakes of paste, and these were again heated until the proper tint was reached. These cakes were fused in crucibles and allowed to cool in them, so that the impurities rose to the surface or settled at the bottom. The crucibles were then broken away, and the impure glass at the top and bottom chipped off, leaving a lump of glass, which was then broken up and softened so that it could be rolled into thick rods. These rods were then drawn out into slender rods or hollow tubes or rolled into flat strips, and these rods or ribbons were used by the glassmaker to produce beads, vases, or inlaid work. It is noticeable that, in the view of Dr. Petrie, the vases from this site were not blown, but were formed by coating a core of sand with melted glass, and pressing out the foot and lip by hand, while the decoration was produced by rolling in threads of colored glass. (Consult Petrie, *Tell el-Amarna*, London, 1894.) Vigorous exception, however, has been taken to this view by other scholars, who hold that the facts on which Dr. Petrie based his view are entirely compatible with the belief that the vases were blown. In general, glass was used for the manufacture of small objects, and especially for the imitation of precious stones, in which the later workmen attained extraordinary skill. Cutting and engraving were also early practiced. Apart from these independent uses of glass, it was very largely employed for inlaying, while an enamel or glaze on clay, stone, or wood was a favorite form of decoration from early times. A very large proportion of the scarabæi, amulets, and small ornaments found in Egypt or exported to foreign parts are of various earths covered with a vitreous glaze, producing the ware incorrectly termed "Egyptian porcelain." However empirical the methods of the Egyptians, there can be no doubt of the technical skill attained by them, and even in Roman times the Alexandrian glassworkers maintained their preëminence. It was not till the Hellenistic period that value seems to have been set on clear glass, for, though clear glass was known earlier, it is certain that Egyptian taste valued only the highly colored varieties.

Phœnicia. Tyre and Sidon were celebrated for their glass, and Pliny (*Hist. Nat.*, 36, 190) locates the invention of glass at the mouth of the river Belus in Syria. His story is that the crew of a ship laden with nitre landed at this point, and when preparing to cook their food found no stones on which to rest the kettle. They therefore used lumps of nitre from the ship, and as these were fused with the fine sand a stream of liquid glass flowed out. Glass was certainly known long before the Phœnicians manufactured it, and the heat of an ordinary fire would be quite insufficient to fuse glass; but the fact remains that the river Belus was always an inexhaustible mine for ancient glassworkers, and modern travelers still describe the white sands heaped on each side of the stream. The glass factories of Tyre and Sidon were among the most noted of ancient times and remained conspicuous under the Roman emperors. Sidon is credited with the invention of mirrors. She certainly produced the best in the world in her time and knew the value of manganese in making glass clear. The artisans of this city used the blowpipe, the lathe, the graver, and the casting plate with splendid results. In the view of some scholars, the Phœnicians did little more than carry on the processes learned by them from the Egyptians; they were not great artists, but skillful fabricators and traders, and, as a result, their glass is found throughout the Mediterranean. Other scholars, however, attaching great weight to Pliny's account, regard Syria as the birthplace of glassmaking and think that the Egyptians derived their knowledge of it from Syria; they believe that thus we can adequately explain the fact that the glass industry, when first it meets us in Egypt, is fully developed. The date of any single piece is usually hard to determine, nor is it of great importance, as there are but slight variations in style at different periods and little advance in technical skill. Indeed, it is often impossible to say whether a specimen is of Phœnician or Egyptian manufacture.

Assyria and Babylonia. Though glass is scarcely found in the Mesopotamian ruins, glazed or enameled bricks, statuettes, and small objects are numerous. Transparent glass was also known, and a fine example is the bowl of transparent green, now in the British Museum, bearing the name of King Sargon (722 B.C.). This bowl is not blown, but turned and cut from a lump of cool glass. It seems probable that this and other objects of transparent glass are importations from Phœnicia.

Persia. The use of enameled bricks for wall decorations was continued by the Persian kings, and the Louvre contains parts of the friezes representing lions and the royal guard which adorned the palace of Xerxes at Persepolis. The beautiful enamels of Persia are famous, and her delicate, lacelike porcelain, filled with transparent glass, is celebrated as Gambroon ware. In the Paris Bibliothèque is the famous cup of Khosru I, King of Persia (532 A.D.), a shallow bowl of crystal with the monarch's figure in relief in the central medallion, encircled with disks of red and white alternating with green, the whole glass ornamented in relief and bound with gold.

China and India. The Chinese claim that glass and even lenses were known and manufactured by them as far back as 2000 B.C., but the claim is most improbable, and it is not likely that the art was introduced before the Christian era. Modern Chinese glassworks imitate agate and other stones beautifully. All their glass is made from pulverized quartz, as in Japan and India. The Hindus, Siamese, and Chinese have from time immemorial placed lumps of glass on the high parts of their buildings to avert lightning. Indian enamelers have been celebrated from ancient times, but they work with simplest processes. The mosaic industry of Agra originated in the Taj Mahal, for which Italian artists were imported. Glass has never been used for windows in the Far East, except rarely in palaces, and to the present day oiled paper is the usual glazing throughout China, the palace windows being generally filled with mother-of-pearl or tortoise shell.

Greece. Homer does not mention glass (unless the word *κύανος, kyanos,* denotes a blue-glass paste, such as decorated the alabaster frieze found at Tiryns), but excavations have shown that beads and such small objects were known in Greece during the Mycenæan period, though no fragments of glass vessels have been discovered. It seems probable that these objects were imported, as there is no trace of the manufacture of glass on Greek soil, even in much later times. The excellence of the Greek ceramic ware made glass of less importance. Even the word *ὕαλος* is not used in the sense of glass before Aristophanes (425 B.C.), and then it refers to vessels used at the Persian court. In later time undoubtedly Greek artistic training exercised a powerful influence upon the glassmakers, some of whom bore Greek names, but the industry never became Hellenic, and Egypt, especially Alexandria, and Syria remained until Roman times the chief sources for fine glass.

Rome. In Italy glass first appears at the very beginning of the iron age, in the cemeteries of the Villanova (q.v.) type, naturally in the form of beads and other paste ornaments. Glass bowls and bottles, however, are found in Etruscan tombs, and with the extension of the Roman power the use of glass increased enormously. Not only was glass imported from the old seats of this industry, but the manufacture was introduced into Italy, and thence into the provinces of Gaul, Spain, and Germany. Here, as in Italy, glass and iron had been introduced together, but only ornaments, beads, amulets, etc., were purchased from traders. Under the favorable conditions the industry flourished greatly, and glass became so cheap that ordinary cups or platters were sold in Strabo's time for a farthing. On the other hand, the expensive and beautiful vessels, according to Pliny, had almost driven out the use of gold and silver. The absence of fine porcelain led to a much more extensive use of glass than in modern times; and by Christian times glass was used even for windowpanes. It was used, too, in pavements and in thin plates as a coating for walls. Glass was used in many colors, and the skill of the ancient artists produced works not surpassed or even equaled in later times. In variety of shapes and in some points of technique the Venetians surpassed the ancient Romans; the special merit of the ancient workmen is in the beauty of the coloring and the skill with which the various threads or layers are combined, producing the effect of onyx and agate. The glass was *blown, cast, pressed, ground,* and *cut.* It was used for drinking cups, flasks, bowls, and other vessels, for mosaics, small ornaments of various kinds, and especially for imitations of precious stones, which in many cases were finely engraved as intaglios or cameos. Two methods of decorating are of special beauty. In one the workman blew the glass in two layers—the inner of a dark color, usually blue, and the outer of white. The outer layer was then cut away on the wheel, leaving the design in white relief on the dark background, as in a cameo (q.v.). The most famous example of this technique is the Portland Vase (q.v.) in the British Museum, though another fine specimen is in Naples, and fragments are very common. The second method is represented by but few specimens, all apparently egg-shaped cups without a foot. The vessel is inclosed in a network of rings of glass which are attached only by slender filaments to the surface of the cup. They seem to have been produced by cutting away the outer surface of the original vessel—an exceedingly delicate and tedious process, though some authorities hold that the outer network has been applied while soft and worked out with the forceps. Consult especially Fröhner, *La verrerie antique* (Le Pecq, 1879), an account of the Charcot collection, with a full historical introduction and numerous fine colored plates. More popular is Wallace-Dunlop, *History of Glass in the Old World* (London, 1883). A very elaborate work is Kisa, *Das Glas im Altertume* (3 vols., Leipzig, 1912), dealing with the origin of glassmaking, glass in Egypt, Phœnicia, Syria, Greece, Rome, and its provinces, etc.

Byzantium. Constantine, on transplanting his capital to Byzantium (330 A.D.), selected the best artisans in glass and not only gave them studios in a quarter of the city called "glassmaking quarter," but caused them to be exempt from the tax levied by previous emperors. Accordingly glassmakers flocked from fallen Rome, carrying the fame and the skill of the Imperial city to the East, and Byzantium supplied all Europe with *verre de luxe* until the rise of Venice. Factories were reëstablished in Greece, Macedonia, Phœnicia, and Alexandria, and after the Arab conquest they continued to be the sole sources of artistic glass through the Middle Ages. The early Byzantines followed classic models, often badly, but later a Byzantine school arose which prevailed throughout Europe until the thirteenth century. Mosaic art, under the impetus of Christianity, was developed to its greatest glory for mural decoration, as the Byzantines believed and demonstrated that "mosaic is the only painting for eternity." Their world-renowned specimens at Ravenna (440 A.D.) are superior to those of the Romans. In the famous St. Sophia are mosaics made in the sixth century. On the lower walls these mosaics are of marble, and of glass cubes or tesseræ on the upper walls and ceiling. These and its colored windows caused Justinian, its builder, to say, "I have surpassed thee, O Solomon." The church of the Transfiguration, Mount Sinai, is adorned with precious Byzantine mosaics of the seventh and eighth centuries. The Byzantine churches were usually lighted by a series of small windows around the base of the dome. Some of the original plates of cast glass still remain at St. Sophia. Colored window glass is not mentioned till towards the end of the eighth century. A common method of inserting it, which is still practiced in the East, was to perforate slabs of marble, or even the plaster, in patterned openings and place the glass in these.

One of the terms of peace at the beginning of the eighth century between Caliph Walid and Justinian II was that the latter should furnish a quantity of mosaic for his mosque at Damascus. A series of Byzantine mosaics extends from Constantine to Charlemagne. So late as the eleventh century, Pope Victor III sent to Constantinople for workers in mosaic. Imitation stones were also made wonderfully well there. The blue cup at Monza (600 A.D.), 3 inches in diameter, said to be made of a single sapphire; the celebrated emerald table captured at Toledo in the fourteenth century, long believed to be cut from a single emerald, inlaid with gold and precious stones, and valued at 100,000 dinars; and the famous Sacro Catino of Genoa, a shallow dish which passed as one of the most sacred relics of Christendom, the veritable "Sangraal," the ransom of a captive king, and supposed to be cut from an emerald until pronounced green glass, in 1761, by a French chemist—were all from Byzantine factories. The precious sacrament cups of glass, used in the church service, were theirs. They made the glass medallions circulated as test weights for money throughout the large estates of the Fatimite princes, which have been mistaken for coins. These were abolished in 888, but Venice continued to make glass weights in 1279, as the old Greeks had done. From Byzantine centres the Crusaders brought back into Europe the manufacture of glass, and it is probably from this source that Venice received its early impulse and first lessons in glassmaking.

Venice. Refugees in Venice made glass as early as the fifth century, the abundance of excellent sand and alkaline sea plants facilitating the industry. St. Mark's, built in 1159, gave an impetus to mosaic work on the spot, and the taking of Constantinople (1204) drove many Greek workmen to the asylum of Venice with Byzantine secrets. The interior walls of this church are entirely covered with glass mosaics, representing the principal events of biblical history. The work on these mosaics extended over a period of 250 years. The wonderful color effect and beauty of these mosaics have been eloquently described by Ruskin. With the rise of the Italian painters, mural painting took the place of mosaics for wall decoration, and no mosaics of importance were made after the fifteenth century. But in the meantime the Venetians had turned their attention to the production of ornamental glass and guarded the secrets of its production with the most jealous care. In 1275 the Council of Venice prohibited the exportation of glass materials. The fear of fire abolished the furnaces, in 1291, from Venice proper to the outlying island of Murano, where the artists formed a small republic and have flourished ever since. The fame of Venetian glassmakers led other countries to tempt them away, but the Council of Ten jealously guarded the secrets of Venetian wealth. No stranger could learn the art. Any workman carrying his skill to another country was followed and ordered back. If he refused to come, his relatives were imprisoned. If he persisted, an emissary was dispatched to kill him. A wandering glassmaker called Paoli was tracked to Normandy, where he was stabbed with a dagger on which was written "Traitor." But the Venetian police had no power in Murano, and that island had its own codes and magistrates. Nobles gave their daughters in marriage to glassworkers, and the children were counted of the nobility. The shops of Murano formed, in 1495, a magnificent street a mile long, where every conceivable object was fashioned. The furnaces were small, a few workmen about each, which explains the diversity of design and the scarcity of pure glass, such as only long fusion in large furnaces can produce; but nowhere in the world could the precious products of Murano be matched. The vases and cups were royal presents to every sovereign. Their dishes displaced gold. Many of their wares were in patterns like madrepore coral. Their *mille fiore* was a starry mosaic of white threads combined in a blue ground. A favorite style imitated the pulp of an orange. *Vitro de trina* ware was made of twisted rods of opaque white in clear glass, and most delicate of all was their *latticelli*, a lacelike network in exquisite designs. They also secured wonderful effects in mosaic, imitation gems, and cameos. All of these were simply repetitions or extensions of wonders done ages before by the Romans, Greeks, and Egyptians, which had since become lost arts, and all the lightness and wealth of color of ancient glass were exquisitely copied in an endless variety of fantastic forms. Fishes, lions, dragons, etc., were made to assume grotesque effects with the colors of different wines. They blended two sheets of color into one. They invented aventurine and far surpassed their masters in reticulated glass. About 1300, Murano artists conceived of covering plates of glass with an amalgam of tin and mercury, and their mirrors became proverbially fine. Marco Polo prompted them to manufacture beads for African trade. These beads became very popular, and enormous numbers of them were made, so that now, wherever the trade of the Middle Ages penetrated, they may still be found. These beautiful beads contrast strangely with the vulgar and glittering productions that are now made for the similar purpose of trade with African and Indian tribes. In the early fifteenth century Panfilo Castaldi, a Venetian engrosser of deeds, made movable glass types and printed from them, and tradition says that John Faust, his friend, visited his scriptorium. Modern spectacles were invented by Salvino d'Armati, of Florence, according to the statement on his tombstone (1317). At the beginning of the seventeenth century there were 300 glasshouses in Murano, but at the commencement of the nineteenth century all were gone except a small mosaic factory. The art, however, was not allowed to die out entirely, but was cherished by a few workmen, one of whom, Radi, undertook the work of restoring some of the mosaics at St. Mark's. Salviati, an Italian lawyer, assisted in the Radi enterprise, and with the aid of English capital two sets of workshops have been established where ancient methods and objects such as mosaics are skillfully copied, and new and beautiful work is also done. The Venetians excel in glass novelties, such as mirrors, beads, tableware, bric-a-brac, and aventurine. Their glass is very soft so that it can be spun, woven, or otherwise fashioned into the daintiest designs. In the production of a single piece, it is said, the glass may be reheated 50 times.

France. The factories of Poitiers were active during the Roman and Frankish periods, survived the Norman invasion, and were left as a legacy to the gentlemen workers of the Middle Ages. Ruins of glass vases abound in the Poitiers territory, and such town names as Vieille, Verrières, Voirie, Verrines, come from their glassworks. The ancient cemeteries of Poitiers and La Vendée yield a rich harvest of glass, and fully 20,000 vases have been found at Terre-Noire, Bordeaux. The Imperial factory of Frontincennes, at Forêt-Eu, cradle of all the later Norman glassworks, is supposed to have been founded in the second century and is surely the oldest in the world. The beautiful Roman glass seen in the museums of France is thought to be of native manufacture. The Merovingian ornaments have a peculiar dynastic mark in the thin gold threads dividing differently colored layers. In 677 many Greek workmen were called to France. Normandy was the first country to give privileges to glassworkers. In the tenth and eleventh centuries four noble families received the special prerogatives of glassworkers, and these were confirmed by successive kings until the eighteenth century. Factories in other parts of France were established by gentlemen from Normandy, and the Crusaders brought back many improvements in glassworking. Charles V gave all glassmakers exemption from taxes, and later kings extended this privilege as well as permitting noblemen alone to labor at this art. In 1338 Humbert, Dauphin of Viennois, granted a portion of the forest of Chamborant to a glassmaker to establish factories there, provided he should furnish him 3000 pieces annually. M. Jaquin, in 1656, invented the imitation pearls which are made by lining the beads with fish scales, instead of the old quicksilver lining, copying the uneven shapes of pearls in perfect mimicry, of all shades. Glass painting was first developed, if not invented, by the French, the earlier artisans being content with mosaic. Painted glass windows are said to have originated in the school of Limoges, about 800, where a Venetian colony was planted. In all the old French churches the glassmaker's art was conspicuous. The windows of Saint-Denis (rebuilt for the sixth time in 1108) are pronounced the oldest mosaic pictures in France. In 1665 Colbert tempted away 18 Venetian workmen, with their secrets, and founded a mirror factory in Paris, which in 1693 was enlarged and transferred to Saint-Gobain, where the manufacture still continues on a grand scale. About this time Thévart rediscovered the *casting* of plate glass, making plates 84 by 50 inches. All previous plate glass had been produced by *blowing* and was therefore limited in size. For over 100 years cast plate glass was to be obtained only from these makers. In 1740 a factory for French cylindrical window glass was established, with German workmen, at Saint-Quirin, which became the parent of the modern French, Belgian, and English plate-glass works. In 1823 D'Artiques established the world-renowned "crystallerie de Baccarat."

Germany. Roman glass has been found in abundance along the Rhine, a fact which indicates the early date of local manufactures. The Frankish jewels were of Teutonic origin. In the ninth century, probably, the Germans taught glassmaking to the northern nations. The bishops of early Germany specially encouraged glassmaking to dispel pagan idleness with Christian industry. The inhabitants of Tegernsee, Bavaria, have lately held a festival in honor of the invention of glass painting, which, they claim, dates from the windows of the abbey in that town, made in 999. For a long time painted glass and frescoes were the only library of the people. Lehmann, of Prague, reinvented the casting of glass in molds in the seventeenth century. In 1609 cut glass was first made by him, and it soon outrivaled Italian glass. Cut glass had been made by the ancients, but the art had probably been lost. Bnati, a glassmaker of Murano, worked three years in a Bohemian glasshouse, as a porter, to learn its secret, and returned in 1739 to obtain a patent for Bohemian cut glass. Henry Schwanhard, in 1670, invented the etching of glass with hydrofluoric acid. The Electoral glassworks, near Potsdam, established in the eighteenth century, became famous for their gold ruby, invented by Kunckel (1679). Mirror making was introduced from France in the eighteenth century.

England. Great difference of opinion prevails regarding the origin of glassmaking in Great Britain, some claiming that it was established before the Roman Conquest, and others as late as the sixteenth century. French workmen, in 699, were brought over to glaze St. Peter's, York. Benedict established French glassmakers at Wearmouth, 675, for the building of his church; but for centuries glassmaking languished in Britain. Henry III had but one glass drinking cup, which he specially prized. France taught England the secrets of glassmaking. The oldest painted windows in England are those of 1174 in the choir of Canterbury Cathedral, which are as French as those in Saint-Denis. As late as the sixteenth century oiled linen was the usual window material, and a century later the royal palaces of Scotland had only the upper rooms glazed. In 1677 the Duke of Buckingham brought glassmakers from Murano to Lambeth to manufacture crystal vases, looking-glasses, and coach windows. The revocation of the Edict of Nantes (1685) sent many glassmakers to England, and the manufacture speedily improved. Early in the seventeenth century the greatest of modern glass inventions was achieved in England, the making of lead flint, producing brilliant glass, which was impossible for earlier makers. The famous plate-glass works of Ravenhead were established in 1771. Towards the close of the nineteenth century the art of making glass mosaics was revived in England, largely through the efforts of Sir W. B. Richmond.

United States. Prior to the European colonists the only glass known in America was the "obsidian" volcanic glass. In 1608 some glassmakers were among the artisans brought to Jamestown, Va., but the craze for tobacco interfered with their industry. In 1621 several Italian glassworkers were imported to manufacture beads for the Indians. In 1639 a glasshouse was erected at Salem, Mass., and William Penn alludes to a Quaker glasshouse in 1683. A glassmaker, Jan Smeedes, received an allotment of land on Manhattan Island, and the business which he carried on gave the name "Glassmakers' Street" to the present South William Street of New York. In 1754 a Dutch gentleman, Bamber, built glassworks in Brooklyn, N. Y., and the first bottle blown by him, bearing the name and date, is in the collection of the Long Island Historical Society, Brooklyn. Glassboro, N. J., was founded by a colony of German glassmakers, who moved there in 1775. In 1787 the Massachusetts Legislature gave to a Boston glass company the exclusive right to make glass in the State for 15 years. This is said to have been the first successful glass factory in the United States. Pittsburgh, Pa., first made glass in 1796, and is still a most important glassmaking centre. At the very beginning coal was used instead of the traditional wood fuel. This, with the abundance of excellent sand in the adjoining rivers, gave the industry a phenomenal development there, which has been increased by the substitution of gas and oil fuel. In 1827 pressed glass was invented by a carpenter of Sandwich, Mass. With the discovery of a cheaper and better fuel, in the form of natural gas, the centre of glassmaking moved west of the Alleghanies, where it still remains. As natural gas failed, petroleum was substituted and proved an excellent fuel. By the close of 1880 the census shows that the glass industry of the United States had been brought to a very extensive and prosperous condition. There were then 211 factories, employing 24,177 men, sending out an annual product worth $21,154,571. In 1890 the number of factories had increased to 294, and the product to $41,051,004, and in 1909 there were 363 establishments and the product was $92,095,203. Within recent years artistic glassware of great beauty has been produced in the United States, notable examples of which are the stained-glass windows and mosaics of leading makers and such as La Farge and Tiffany and the famous "Favrille" glass of the Tiffany Company of New York. The United States still imports more glass than she exports, the exports being largely that peculiar product of Yankee ingenuity, pressed glass.

VALUE OF GLASS AND GLASSWARE IMPORTED INTO AND EXPORTED FROM THE UNITED STATES

FISCAL YEAR	IMPORTS Total value	EXPORTS Total value
1914	$8,191,133	$3,729,623
1913	6,537,293	4,193,642
1912	6,210,625	3,494,153
1911	6,881,891	3,246,391
1910	6,553,764	2,805,401
1900	5,037,931	1,936,119
1890	7,411,343	882,677
1880	5,221,511	749,866
1870	4,157,643	530,654

Chemical and Physical Properties. Chemically any vitrous compound is called glass, but commercially glass is a fused mixture of two or more metallic silicates, and is often named from the predominant base, as "soda glass," "potash glass," "lime glass," and "lead glass." The essential ingredients are silica and alkali. *Flint glass* is a mixture of the silicates of lead and potassium; *Bohemian glass*, of the silicates of potassium and calcium; *plate* or *sheet glass*, of the silicates of calcium and sodium; *bottle glass* is a mixture of the silicates of sodium, aluminium, and calcium; *Venetian glass*, of sodium, potassium, and calcium. Sodium, potassium, calcium, and lead are the bases that form almost all glasses. To obtain the silica, sand is now generally used—river or sea sand sufficing for cheap grades in spite of the impurities, but for fine qualities the sand is quarried. American sand is pronounced by experts superior to English and French. The principal deposits

GLASS INDUSTRY OF THE UNITED STATES, 1869 TO 1909

(*From Thirteenth United States Census of Manufactures*)

GLASSMAKING	NUMBER OR AMOUNT				
	1909	1899	1889	1879	1869
Number of establishments	363	355	294	169	154
Persons engaged in the industry	72,573	55,256	*	*	*
Proprietors and firm members	87	170	*	*	*
Salaried employees	3,575	2,268	*	*	*
Wage earners (average number)	68,911	52,818	44,892	24,177	15,367
Primary horse power	123,132	52,943	28,241	5,672	1,857
Capital	$129,288,384	$61,423,903	$40,966,850	$18,804,599	$13,826,142
Expenses	85,374,185	50,196,736	36,527,203	*	*
Services	44,293,215	29,877,086	22,118,522	9,144,100	7,589,110
Salaries	4,993,591	2,792,376	*	*	*
Wages	39,299,624	27,084,710	*	*	*
Materials	32,119,499	16,731,009	12,140,985	8,028,621	5,864,365
Miscellaneous	8,961,471	3,588,641	2,267,696	*	*
Value of products	92,095,203	56,539,712	41,051,004	21,154,571	18,467,507
Value added by manufacture (value of products less cost of materials)	59,975,704	39,808,703	28,910,019	13,125,950	12,603,142

* Comparable figures not available.

are in Massachusetts, Pennsylvania, West Virginia, Illinois, Missouri, Ohio, Indiana, New Jersey, New York, and Maryland, but good sand is abundant all over the United States.

Ancient glass was commonly a potash glass, and the inferior potash, made from the ashes of plants and sea plants, was used until succeeded by soda ash, carbonate of soda made from salt by Leblanc's prize discovery of 1792, which opened a new era in glassmaking. Since 1875 "salt cake," sulphate of soda, has been largely used, producing a harder glass of a bluish color, while the carbonate of soda glass is softer and yellowish. Lime, next to silica in importance in producing toughness, is a modern discovery. Of old, it was used sparingly as a cheap substitute for soda and potash; now, with improved facilities, it produces "lime flint," unequaled for lightness and beauty in common wares. It is used in the form of carbonate of lime or slaked lime or calcium hydroxide. Lead oxide (litharge) began in the seventeenth century to produce the heaviness and brilliancy of the English flint glass now made in every industrial country. Another oxide of lead, called red lead, is also used in modern glass and is said to be preferable on account of its excess of oxygen. Other ingredients, as barium, zinc, boron, and lithium, are used in special glasses. Manganese is introduced in modern glass as a decolorizer, to modify or neutralize the greenish tint produced by iron, which is an unwelcome ingredient of nearly all materials. Arsenic is used also as a decolorizer and also as a flux, while charcoal or carbon is employed when salt cake is used to complete the reaction, this being indicated by the following equation: $2(SiO_2 + Na_2SO_4) + C = 2Na_2S_1O_3 + 2SO_2 + CO_2$.

The proportions of the ingredients differ widely among various establishments. Potassic silicate is colorless and contributes brilliancy and fusibility; sodic silicate is also bright and fusible, and makes a yellow tint with green so that potash must be used; plumbic silicate increases the fusibility, ductility, and brilliancy of glass. The greatest care must be taken in regulating the various constituents entering into the glass, as an excess or deficiency of a material will have a most deleterious effect on the glass, either in its appearance or in its physical properties. Of these, aside from its transparency, homogeneity, and strength, specific gravity is important. If there is too much sand, it is impossible thoroughly to melt the glass, and it is full of stones, seeds, strings, and other imperfections. The specific gravities of various kinds of glass are as follows: window glass, 2.50 to 2.70; plate glass, 2.40 to 2.50; bottle glass, 2.60 to 2.70; lead-flint glass, 2.80 to 3.25. Hydrofluoric acid is the only acid known which will dissolve glass. Glass is slightly acted on by alkaline solutions, by light, air, and boiling water. It is usually transparent or at least translucent. The most important property of glass, however, is the condition of viscosity, intermediate between solidity and liquidity, which it assumes when the ingredients of which it is composed have been thoroughly fused and are maintained at the proper temperature. In this semiliquid state it may be blown into any hollow form like a bubble, spun into the finest thread, or pressed or cast into any

CHEMICAL COMPONENTS OF DIFFERENT VARIETIES OF GLASS

(From *The Mineral Industry*, 1900)

COMPONENTS	WINDOW GLASS					PLATE GLASS				LEAD FLINT (CUT GLASS)			
	American	Belgian	German	English	French	American	French	Belgian	English	American	Belgian	French	English
	%	%	%	%	%	%	%	%	%	%	%	%	%
SiO...	72.26	69.48	72.68	71.40	69.65	71.2	72.1	72.4	78.64	63.76	53.70	52.41	51.41
Al_2O_3	....	....	....	....	....	...	...	...	....	....	....	....	....
Fe_2O_3 .	1.42	2.59	1.06	1.90	1.82	1.0	...	...	2.68	.90	1.07	.96	....
CaO . .	13.34	13.40	12.76	12.40	13.31	14.2	12.2	13.2	6.09	MgO .31	0.59	.77	....
MgO . .	....	.26	.26	....	....	...	...	...	....	PbO 21.93	34.91	35.24	37.4
Na_2O .	14.01	14.55	13.24	15.00	15.22	13.9	15.7	14.4	11.63	12.16	9.12	10.37	....
K_2O . .	....	....	....	....	....	...	...	...	1.34		.30	....	9.4

COMPONENTS	LIME FLINT (PRESCRIPTION)				GREEN BOTTLE			CHAMPAGNE	JENA				STRASS
	American	English	German	French	American	German	French	French	Thermometer glass	Combustion tube	Verbund-glass	Chemical	French
	%	%	%	%	%	%	%	%	%	%	%	%	%
SiO...	73.96	....	75.61	69.6	69.82	60.4	63.34	61.90	67.30	66.61	71.95	74.07	38.2
Al_2O_3	.44	....	1.01	5.2	2.58	10.4	4.72	4.41	2.50	3.53	5.00	1.20	1.0
Fe_2O_3						3.8	4.42	1.85					
CaO . .	13.94	....	7.38	13.0	7.82	20.7	21.34	17.95	7.00	11.81	....	8.25	...
MgO .	.41	....	....	...	....	.6	....	6.38	....	....	....	....	...
ZnO . .	.18	....	4.84	...	....	...	....	....	....	....	....	....	53.0
K_2O .	10.85	....	11.39	8.0	1.50	...	2.01	1.13	....	....	....	7.47	7.8
Na_2O		....	....	3.0	18.28	13.2	4.17	6.16	14.00	6.56	11.00	8.63	...
ZnO . .	....	....	....	...	....	...	....	....	7.00	1.30	....	....	...
BaO . .	....	....	....	...	....	...	....	....	....	2.20	....	....	...
B_2O_3 . .	....	....	....	...	....	...	....	....	2.00	7.99	12.00	....	...

desired shape. This property of glass will be considered further on, as the different methods of manufacture are described. Molten glass is an amorphous substance, but when allowed to stand undisturbed for hours it will crystallize. This process is called devitrification, and any excess of lime will cause devitrification more rapidly. The preceding table, showing the components of different varieties of glass, was taken from an article on "Glass," by Robert Linton, in *The Mineral Industry*, for the year 1899 (New York, 1900).

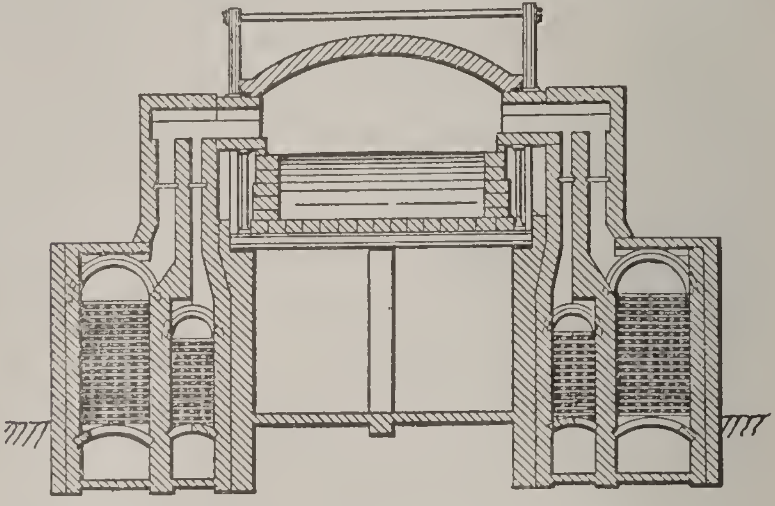
Preparation of the Material. Sand being the commercial representative of silica, it is evident that the quality of glass depends, apart from the effect of different processes of manufacture, upon the quality of the sand, and the more thoroughly the sand can be cleansed of impurities before it is melted, the better will be the quality of the glass. Hence, for the finer qualities of glass, the sand is often subjected to a preliminary process of purification by washing, burning, and sifting. The sand is *washed* by stirring it thoroughly in large volumes of water and then allowing it to settle; the lighter particles of dirt, chalk, and other extraneous matter will remain in suspension after the heavier sand has settled, and can be drawn off. The sand is *burned* to remove the moisture and organic matter; it is placed in the bed of an oven and played upon directly by the flame. Last of all, it is *sifted* through copper gauze. The chief impurities found in sand are iron, lime, alumina, chalk, and magnesia, besides organic matter and dirt. Of these the iron is the most troublesome, so that it is customary to estimate the value of sand according to the amount of iron which it contains.

The process of mixing the prepared sand with the other ingredients is called "mixing the batch," the batch being the mechanical mixture of the materials whose chemical combination, brought about by heat, produces glass. It is evident that the materials of which glass is to be made must be mixed with the greatest nicety, knowledge, and skill, if a perfect product is to be obtained. Heretofore the proportioning of materials has been done empirically, but in the best modern factories there is more dependence put upon chemical analyses to determine the proper mixture. The accompanying table shows typical mixes for American glass. While it is true that a practical glassmaker might not follow any of these recipes exactly, but would have to modify them to suit the peculiar requirements of his own material and furnaces, yet they will serve to give a general idea of the average composition of the batches from which some of the different kinds of glass are made in America. See GLASS SAND.

RECIPES FOR AMERICAN GLASS

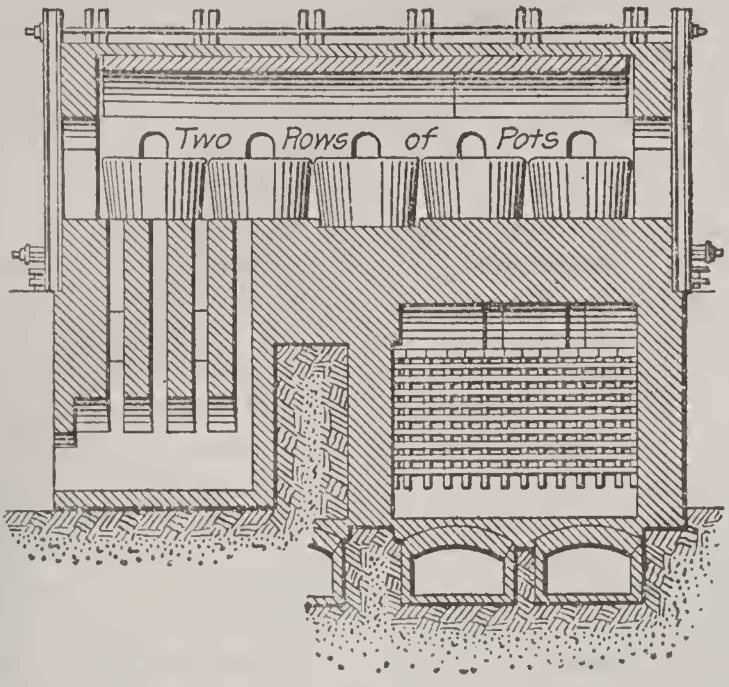
	WINDOW GLASS			PLATE GLASS			GREEN BOTTLES			LEAD FLINT	
Sand	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Salt cake	44.0	40.0	42.0	....	....	40.0	....	....	38.0	....	....
Soda ash	....	4.0	....	30.0	36.0	....	38.0	35.0	....	....	....
Limestone	26.0	38.0	40.0	24.0	24.0	38.0	24.0	22.0	34.0	....	....
Carbon	4.0	8.0	6.0	1.0	.75	4.0	....	....	....	....	....
Arsenic	....	....	....	....	1.0	2.0	....	....	....	.5	.15
Charcoal	....	....	....	....	....	....	....	....	5.0	....	....
Potash	....	....	....	....	....	....	....	....	....	36.0	34.0
Red lead	....	....	....	....	....	....	....	....	....	40.0	48.0
Nitre	....	....	....	....	....	....	....	....	....	5.0	6.0
Borax	....	....	....	....	....	....	....	....	....	.3	.06
Antimony	....	....	....	....	....	....	....	....	....	....	.02

Furnaces and Fuel. The furnaces used for melting glass are of two general types, pot furnaces and tank furnaces. The traditional furnace, still the type of pot furnace for flint-glass melting, is round, with from 8 to 12 "monkey pots" in a circle around the central fire, at the base of an enormous chimney. The monkey pot is an oval cylinder with a round top, open only on the upper part of one side. Each one is inclosed in an arch of fire brick, with its mouth only visible outside, and when it cracks the heat must be lowered and the arch torn down, while the red-hot crucible is dragged out and another substituted for it. The melting pots play a very important part and demand the most careful preparation. The slightest flaw is discovered by the intense heat, and the precious contents are emptied into the well below the furnace. The clay is most carefully selected, but, after months of labor in its construction, the monkey pot yields only a few weeks of service before it breaks. For window, plate, and bottle glass manufacture the furnace is rectangular, with doors at each end for the moving of the pots, which, when they are used, are simply great cups with flat bottoms and sides broadening upward to an open top. But the pots are always unreliable and troublesome affairs. When one suddenly cracks, perhaps a few days after its inauguration, everything must be stopped for a day till another is built in and its contents fused; when the glass is all worked, half a day is taken for another batch to be melted; while the molten glass is worked, the furnace must be cooled; moreover, the sulphur and soot from coal fuel are constant annoyances. To escape these difficulties the "tank furnaces," heated by gas, are now used and have revolutionized the whole glass industry.



SECTION OF WINDOW-GLASS TANK FURNACE, BAUDOUX-PAGNOUL TYPE.

In 1861 the first regenerative glass furnace was introduced into Germany by its inventor, Siemens, and this type of furnace is in wide use in Europe and America. In these furnaces the gas is generally produced from coal outside of the furnace, mixed with the air, on the principle of the Bunsen burner. In the United States natural gas, and later on petroleum, have been largely used as a fuel. Instead of melting pots there is a tank, constructed from pot clay, covering the whole area of the furnace, and divided by floating partitions into compartments. The melting compartment at the rear receives the raw material through the doors. As this melts, it flows into the refining compartment, where a higher temperature purifies it till it flows under the second partition into the gathering compartment, and there a lower temperature thickens it for the blower. A recent improvement dispenses with the floating partitions by the use of floating vessels, which gather the molten glass at the lowest depths in the tank and raise it to the surface to be completely refined in a special compartment, whence, as it sinks in perfect fusion (the best glass being the heaviest), it can only flow into the working-out compartment. The depth of the floaters is usually one-fourth the depth of the tank. These tank furnaces may be worked continuously, with no change in temperature and no discoloration from smoke and on a colossal scale.



REGENERATIVE OPEN-POT FURNACE.

Improvements in the methods of glass manufacture have all been in the direction of substituting gaseous for solid fuel. Even in pot furnaces gas is preferred, and for a tank furnace it is indispensable. Natural gas is the ideal fuel, but is very limited in its occurrence, and when it cannot be obtained gas is manufactured from other fuel. Its advantages are its freedom from ashes and other dirt, and the ease with which the flame may be applied and controlled.

A commercial classification of glass and of the principal types of furnaces producing it may be given as follows: 1. *Polished plate* embraces all glass cast upon a smooth table, rolled to the required thickness with a roller, annealed, and then ground and polished. Under this head comes *thin* plate, a recently developed process. 2. *Rough plate* includes all glass cast as above, but not ground and polished. The principal varieties are *ribbed plate, colored cathedral, rough plate, wire glass, heavy rough plate* for skylights. 3. *Window glass* embraces all glass blown in cylinders and afterward cut and flattened out and polished while hot. Chiefly used for pictures and mirrors. 4. *Crown glass* is glass blown in spherical form and flattened to a disk shape by centrifugal motion of blowpipe. A little is now made for decorative purposes. 5. *Green glass.* All the common kinds of glass, and not necessarily green in color. Used in manufacture of bottles, fruit jars, etc. 6. *Lime flint* includes the finer kinds of bottle glass, certain lines of pressed tableware, and many novelties. 7. *Lead flint* embraces all the finest products of glassmaking, such as cut glass, fine tableware, artificial gems, and optical glass.

The principal furnaces are: (1) open-pot furnaces for bottles and window glass; (2) open-pot furnaces for plate glass; (3) covered-pot furnaces for flint glass; (4) day tanks, which are practically open-pot furnaces, gas-fired, and with a single tank or pot; (5) regenerative continuous tank furnaces for window glass; (6) regenerative continuous tank furnaces for bottles; (7) recuperative continuous tank furnaces for bottles.

Manipulation. The curious viscosity assumed by molten glass has already been referred to. While in this condition it may be gathered up in a soft mass on the end of a stick, and, if the stick be a tube, the lump may be distended, by blowing through the tube, into a hollow sphere. The form of this sphere or bulb may be modified by manipulating the pipe, and if a second iron be attached by a seal of glass to the other side of the bulb, it may be drawn out into a tube. If the bulb be opened by removing it from the blowing iron, and then, after attaching it at its opposite side to another iron, be trundled rapidly like a mop, the opening will expand, by centrifugal force, into a disk. These are the processes which, infinitely diversified and complicated by the skill of the workmen and the nature of the product, constitute the art of the glass blower. Every melting furnace has several working furnaces called "glory holes," where the glassworker reheats his work. These are small blast furnaces, each affording several openings into the flames.

There are three general methods of shaping glass—by blowing, pressing, and casting.

Window-Glass making in recent years has been revolutionized by the use of machinery. Formerly window glass required the most muscular and skillful workmen, but this has been changed somewhat by modern methods. The older method, however, is fundamental and presents many points of interest. Here the "monkey pots" are filled with the mixed "batch," and when this is melted a second charge is shoveled in, followed, as soon as it flows, by a third and a small amount of "cullet" (broken glass), which fills the pots. Sixteen hours are consumed in the entire melting, and the master melter carefully watches his "monkeys," forcing the furnaces to their highest heat. As soon as the signs appear indicating that the molten glass or "metal" is ready to work, the heat is lowered to thicken the glass for the blowers. Each man is trained to one small part of the whole process and does nothing else. The gatherer holds a mask before his face, by a plug grasped between his teeth, to screen him from the glare of the furnace, and starts the "journey" of the glass by dipping the blowpipe into the pot several times, dexterously forming on its end an oval mass of the white, hot, gummy "metal," which weighs from 20 to 40 pounds, according to the thickness and size of the sheet to be made. Revolving the ball in the glaring pot, he completes its symmetry and consistency and then turns it in an iron mold till it takes a perfect pear shape. This finishes the gatherer's work, and he hands the fiery sphere to the blower, who is the master workman of the establishment. He takes the pipe from the gatherer's hand and blows a huge bubble of air into it, then another and another, swelling the solid sphere into a great decanter, with its thinnest part hardening next the pipe, as one end of the cylinder which is to be evolved from the soft thick mass attached to it. Now he takes his stand on the long narrow platform which leads to his furnace door over a deep pit, swinging the glowing bulb like a giant pendulum into the depths below, persuading it to elongate with frequent puffs at the most effective moments. Now and then, as it cools into hardness, he rests his pipe on a prop and softens the end in the furnace, or he may toss the cylinder above him until it settles into a workable condition. Thus he blows and swings, and, heating from time to time the molten mass, he works it till it grows as long as himself and becomes a round-topped cylinder. When this has cooled considerably, he holds the end in the furnace, blows strongly into it, and, covering the mouthpiece with his thumb, an explosive report is heard. The imprisoned air, heated expansively, has burst an opening through the soft extremity. Revolving the end rapidly in the furnace, the blower enlarges the hole by centrifugal force, till it is as large as the diameter of the cylinder. Then he cools it in a pit to a cherry red, and his part is done. An assistant carries it off and detaches it from the blowpipe by encircling the neck with a thread of hot glass and then touching the line with a cold iron. The cylinder is then cracked lengthwise by a diamond or by passing a red-hot iron inside it. Next the flattener takes it. First he warms the split cylinder, then places it on the stone before him, a fireclay table, which revolves within an oven. The curved sheet opens in the heat like an uneven sheet of paper, and he smooths it by a wooden block. The stone carries it then to the cooling oven, whence it is lifted on an immense fork into a car at the mouth of the "leer," or annealing tunnel, and there it is tempered for service. To-day these huge cylinders are made by a drawing machine, by means of which cylinders of large size are formed by drawing the material from the bath. There are numerous variations of this process and special machines for which many patents have been secured since the beginning of the present century.

Crown Glass, once the favorite for windowpanes, has now shrunk into small importance and is made for ornamental work only. Though much more brilliant, the plates are small and of tapering thickness. The same molten material as that used for sheet glass is gathered in a smaller globe on the end of a blowpipe and rolled into a cone on a stone table, or "marver." The workman blows it then into a sphere and flattens the underside of it, keeping in the centre the "bullion point," or thick apex of the original cone. While he rests the pipe on a horizontal support, another workman with a "punty," or solid iron rod, attaches a small cup of warm glass to the bullion point, and the blower detaches his pipe by touching the neck of the flattened globe with a cold iron and quickly striking it. The punty man carries it off with a small hole where it left the blowpipe, and, heating it in the furnace and revolving it, the opening enlarges wider and wider until it becomes the "crown," which named it, and at last whirls out into a flat disk, or "table." This is kept incessantly turning till it cools enough to be laid on a support, where it is clipped by shears from the rod and sent to the annealing oven. The diameter of such a plate varies from a few inches, like those made in colored glass for fancy windows, to 6 feet. But the square panes cut from it are always small, as the round lump in the centre, the "bullion point," or "bull's-eye," must be omitted, though these are sometimes used for decorative purposes.

Plate Glass has the same composition as sheet and crown glass, but is melted in vast open vessels (sometimes holding 2½ tons) resting upon frames behind fire-clay doors. After the long fusion is perfect, the door is thrown open, and the tank is seized by an immense fork mounted on a truck, and carried bodily to the casting table, where it is hoisted by a crane and poured over the metal bed, which has a very smooth, highly polished surface. A heavy roller passes over it, spreading the glass out in a uniform thickness determined by the height of the strips on either side of the table. Instantly it is rolled into the annealing oven for a tempering of several days. It comes out in the form of rough plate. To be polished it is fastened by plaster of Paris to a large rotary platform which revolves so that the entire surface is covered at each rotation by the disks of grinding machines which rub it with sand, then with emery, and last with rouge, first on one side, then on the other, till 40 per cent of its thickness is removed, and it remains a shining sheet from ¼ to ⅜ of an inch thick. "Rolled plate" is cast upon an engraved table, which gives the impressions of fluted lines or fancy patterns in a translucent body of glass adapted to panels and partitions.

Green Glass, or Bottle Glass, is the coarsest form, made from roughest materials, and is the simplest branch of glasswork. From the time of the early Phœnicians until 1880 the process of manufacturing glass articles had been practically the same. The operative would dip the glass out by a rod or a blowpipe or by a ladle. The article, in the case of a bottle, was then blown by hand, the pipe was broken off from the bottle, and the neck was finished by hand. The glass articles in the Museum of Art in New York taken from the Egyptian tombs were all made in this way, and, though a great number of people had tried to introduce machinery, no improvement had been successful up to about 1880. Before the days of bottle machines the bottle blower would gather the molten glass on his blowpipe, in the quantity desired for his bottle, or jar, or demijohn, puff a bubble into it, drop the inflated lump into an iron mold, which was closed together over it by a small boy, and blow the glass into its permanent shape with the lettering or trade-mark which was cut in the mold. The jagged mouth was then rounded in the "glory hole," and the bottle went to the "leer." Bottle molds are made of brass or iron and must be maintained at nearly a red heat while being used. The simplest form is of two sides hinged together at the base, and the familiar ridges running up each side of a glass bottle are formed where the two sides of the mold shut together. Sometimes the mold is in three pieces, one for the body and two for the neck, in which case the ridges are only on the neck; this is usually the case with wine bottles.

Formerly the blowing of bottles was done wholly by the breath; but recently blowing machines have been successfully operated and have revolutionized the industry. The manufacture of glass articles roughly may be divided into two classes—wide-mouth articles such as fruit jars or milk jars, and narrow-mouth bottles such as beer bottles, champagne bottles, or druggist bottles. The first attempt at an automatic bottle machine was made by an Englishman named Ashleigh. Ashleigh invented a machine to make a narrow-mouth bottle, for which he obtained several patents and was all but successful in practice. He, however, failed because he could get only one bottle out of about 50 that was marketable, owing to the imperfection of the necks. Following along the lines of progress towards the realization of a practical machine, the next invention that was of any great importance was made by John I. Arbogast. Arbogast conceived the idea of pressing a blank of molten or plastic glass, forming the neck in the pressing operation, then placing the blank in a secondary mold which had the required shape, and turning on a jet of compressed air which blew the bottle to the proper shape. This was only applicable to wide-mouth ware and of course was only semiautomatic. A man gathered the glass in the same manner as has been done for 3000 years and dropped it into the mold. It was then pressed down and blown as described above. To-day practically every wide-mouth bottle is made in this manner, except those that are made on the automatic machine, which will be described later.

The next important step in the progress of the glass industry was made by Michael J. Owens, financed by the Libby Glass Company, of Toledo, Ohio. The Libby Glass Company spent, it is reported, $500,000 before they made a bottle commercially. After Owens had made use of the vacuum for forming his blanks, he discovered that the only way to make perfect bottles was always to have a fresh surface of glass that was at a white heat. To accomplish this result it was necessary to have the melting part of the furnace revolving. The glass is melted in the usual way in a Siemen's furnace and then run into a revolving pot, which is about 20 feet in diameter and has a portion about 3 feet wide always projecting out from under the cap or covering of the revolving pot opposite to where the glass enters from the furnace. With this revolving mechanism the result desired was accomplished, and there is always a fresh surface of hot glass into which the gathering mold can be dipped. The capital required to build the automatic machine is very large. Two Owens machines are run in a battery on one furnace, and the outlay for a furnace and two machines has been estimated at not far from $100,000.

The Owens method consists in forming the blank by having the blank mold suspended over the surface of the glass and lowered until it projects into the glass for about an inch. The vacuum is then turned on, and the hollow receptacle is filled with glass by the aid of the vacuum, and the ring is formed. The arm is then raised, and a knife cuts off the glass from the glass in the tank, thus forming a perfect blank. The machine, which revolves, is a succession of molds, 12 to 16 being on each machine. After the blank is formed as described above, the machine revolves one round; the two parts of the blank mold are opened, the neck part still being closed. The finishing mold is then closed up on the suspended blank, compressed air is turned on, and the finished bottle is blown, and after the machine revolves to the point of delivery, both the next mold and the finishing mold are opened in one movement, and the finished bottle drops out. It then slides down a chute and is pushed into the leer by an automatic arrangement. The leers are made automatic, so that the only hand operation that is necessary on the machine is the oiling and care of the machine and the sorting and packing of the glass articles. The great advantage of this invention is that either narrow-mouth or wide-mouth bottles can be made, and one bottle is made absolutely the same size as the other, as the gathering device always gathers the same amount of glass, which is absolutely impossible in the hand operation.

The saving on this Owens automatic machine is enormous. In the old method of working three men and three boys work together to make 15 gross of beer bottles or 10 or 12 gross of fruit jars, while the machine will turn out, in the case of the former, 110 gross a day, in the case of the latter about 90 gross a day. It is easy to see that there is a saving of about 50 hands. This means, in dollars and cents, a saving of $125 to $150 a day. There were in use in 1914 in the United States 60 or 70 of these machines, and it was probable that within five years there would be very few blown-glass articles made in the United States.

Flint Glass broadly includes all the myriad forms of glass except windowpanes and dark bottles. The lead, which the true flint glass alone contains, gives it a characteristic brilliancy and weight. Flint glass is the choicest material for table and cut ware, for optical glass, and for the best blown and pressed ware that fills the household. An extra proportion of lead makes it "strass," from which artificial gems are made. The "lime flint" has a lighter weight and a lustre approaching "lead flint," but it does not equal its royal superior. From this the ordinary utensils are made.

A flint-glass establishment is the most fascinating of glasshouses, as it generally includes blowing, molding, and pressing. A wineglass is made from a glowing bulb as large as a peach. A breath swells it into a hollow sphere the size of the bowl. The gatherer attaches a small knob of soft glass and draws it out into the stem and on the end of this presses a bell-shaped base, previously hardened, which is flattened out into a stable foundation. Shears cut free the top of the bowl, and the furnace rounds the edge, this operation now being done either by a special blowpipe flame or by an electrically heated wire. In fact, machinery may be employed to cut off, round, and polish the edges automatically. So, from three pieces, the ordinary wineglasses and similar-shaped vessels are made.

The costlier kind of table glass has the stem drawn out of the original sphere, and the base, blown separately like a tiny disk of crown glass, is united by its heat to the upper part. All the best "hollow ware" is blown either in the air and finished by hand for the higher grades, or in molds, which produce the dimmer surface of common qualities. All transparent druggists' or prescription bottles are of flint glass, but are made like the green-glass bottles. A good workman can blow 4800 small "prescriptions" in a day of 10 hours. The combination of colors in flint-glass work is particularly interesting. From the pots, where several hues of glass are fused adjacently, the blower dips two or three contrasting layers, all appearing one, and works them as a single lump into a globe or shade or vase. These can be cut in cameo style or twisted into ingenious displays of their structure. The fancy vases, globes, pitchers, etc., with high or low relief patterns, are blown into molds and finished by hand. The perplexing skein work of interlaced threads of color in a body of transparent glass is produced by winding threads of colored glass, which are then shaped into any hollow pattern or pressed solid into pretty marbles. Machinery has been used with marked success in the manufacture of tumblers and lamp chimneys, and compressed air employed instead of the breath of the glass blower.

Cut Glass is first blown into the general shape intended from the brilliant "crystal" and then is ground into a cluster of glistening facets. Grindstones, continually moistened by streams of wet sand, cut the rough pattern, and emery wheels, and finally putty powder, finish the brilliant angles. The grinding mills also remove the punty marks and defective ridges on wine-glasses, etc. "Ground glass" is made by roughening the surface on these wheels or by sand blast or by etching. The last is done by hydrofluoric acid, often in designs for translucent doors and windows, the unetched part of the glass being protected by a coat of wax. The ornaments on fine drinking glasses and shades are engraved by copper disks.

Pressed Glass, the least expensive and therefore the most abundant form of flint glass, is the American contribution to the industry. The pressing machine contains a mold of the inkstand, dish, goblet, vase, or statue to be made, and one man cuts off and drops into it a lump of red-hot glass, while another pulls the lever which shapes the object. By this means unskilled labor can produce perfect results, and the process of manufacture is wonderfully shortened. Pressed glass is often made to imitate Bohemian cut glass, the facets being cast instead of being cut, but the angles are always rounded and the lustre less.

Beads are still made almost entirely in Venice, where over 1000 artisans are devoted to this work alone. The glass is drawn out into long tubes which are filled with sand to prevent their collapse when annealed and are then cut off into fragments. Colonies of women and children thread them and tie them in bundles to be exported to the ends of the earth. The "pearl beads" of France, invented by Jaquin in 1656 and made ever since by his heirs, are blown from glass tubes, lined with powdered fish scales, and filled with wax. The scales of 16,000 fish are required to make one pound of essence of pearl. The finest of these beads simulate the irregularities of pearls in form and color and are difficult of detection without special tests.

Imitation gems, long the favorite object of the cleverest artificers, have passed from glass manufacturers into the hands of specialists who work with the electric furnace and modern chemical methods. Originally the base of many false gems was a heavy uncolored flint glass, containing an abnormal proportion of lead to give it weight and brilliancy. See Gems, Imitation.

Colored Glass is made ordinarily like any others, by the addition of dyes (generally metal oxides) to the molten charge. The same metal produces several colors at different temperatures. Iron gives all the rainbow hues in the order of their position in the spectrum, but its commonest effects are green and orange. Manganese, so staple a decolorizer as to have earned the name "glassmakers' soap," produces in excess pink or amethyst. The manganese in old window glass frequently is betrayed by the analysis of long sunlight in the purple tints that appear. Too high a temperature turns it brown, then yellow, and finally green. Copper makes the reds of cheap glass, especially the ruby glass of the photographers, and when heated further turns purple, blue, and green. Cobalt gives rich blue or black. Gold, in the form of "purple of Cassius" and in a simple solution, creates the finest rubies, violets, and amber, one part of the precious metal coloring 1000 parts of glass. The exquisite objects of amber glass which shade into red are colored from a gold solution in the crucible, and after being fashioned into the desired shape are held in the "glory hole" a few minutes. The second heat transforms the amber to red, and the unheated portion remains an amber tint. Silver, when used as a surface stain, gives a beautiful yellow, and uranium, green or yellow. Carbon, in powdered coal, is used for cheap black and amber bottles. Opalescent ware, in which modern fancy glass excels, gets its color from cryolite, arsenic, or tin.

Mosaic window glass is cast like rough plate glass from small ladles, and the desired tints are carefully selected, to be patched together in harmonious designs by leaden joints. See Window.

Painted glass is colored by enamels fused to the surface. Stained glass is produced by soluble metal oxides applied with a brush and fastened in the stainer's kiln. "Flashed glass," or double glass, is made by coating the embryonic bulb of transparent glass with a dip of colored glass and blowing both as one into a sheet of window glass, a lantern globe, or whatever shape is desired. Opaline glass for art windows is made by pouring colored glass of one or more kinds upon white opaque glass and then pressing the whole with a heavy iron roller. This causes the different glasses to intermingle, affording great varieties of color effect. See Stained Glass.

Optical Glass is a fine quality of glass specially made for specific purposes and the entire manufacture controlled with scientific precision. For this the scientific world has in large part to thank the labors of Abbé and Schott, of Jena. In optical glass the term "flint" implies a glass containing lead, as the density produced by lead causes high refractive power, while "crown" is a lime silicate glass or so composed as borosilicate glass with low refractive power. The fusion of optical glass, like the whole finishing work, requires special care and patience. The melting pot is lined with a glaze of broken glass, having been previously very slowly heated for four or five days. The batch is put in a little at a time and stirred with a fire-clay roller. The molten mass is kept at an intense heat for six or eight hours or more and stirred, to cause all the bubbles of gas to escape, the process being continued till there are no more bubbles. If the temperature is too low, bubbles remain in the glass. If too high, the pot is attacked, and the clay flaking into the melt spoils the glass. The pot of glass is now taken from the furnace and put in an annealing oven and slowly cooled for several days, or the furnace is sealed and allowed to cool of its own accord. The glass is then broken up into pieces, the faulty ones rejected, and the perfect ones charged in disk-shaped clay molds, where they are remelted to the form of the mold. These glass disks are now ready for the final annealing, which is performed very slowly and with great care.

Wire Glass. Wire glass, a combination of wire and glass, has found wide use not only in large buildings, like railway stations, where a single wide-arched roof must span an enormous area and the lighting must be chiefly in this roof, but also for ordinary windows in exposed locations, as a precaution against fire or other accident. The iron of which the netting is composed has a higher fusing point than the glass in which it is embedded, and when exposed to fire it will retain its shape and hold the glass together even after the latter has become plastic. A wire-glass window, door, or casing for elevator shaft, forms an admirable fire screen and is a great protection; in fact, often being required by insurance or building regulations. It has been estimated that much of the fire damage in the United States is caused by insufficient and improper window protection. This was strikingly demonstrated in the case of the San Francisco earthquake and fire, where one building in the path of the fire was equipped with wire glass throughout, and though the glass in the windows was cracked by the heat, the panes remained intact and did not fall out, and the building survived, standing alone, while for blocks around there was nothing but smoking ruins. Ordinary glass panes in a roof are in danger of breaking and falling, and the object sought by the inventor of wire glass was to secure a material at once lighter and stronger than the ordinary glazed-roof windows. The first practical and commercially successful process was patented by Frank Shuman in 1892, and the following year he was awarded a premium by the Franklin Institute for the invention. In making wire glass a very long cast-iron or steel table is set in the floor and heated by gas flames from beneath. Over this the molten glass is poured from a pot containing a ton or more. The woven wire netting is heated nearly as hot as the molten glass. A vehicle holding four heavy rollers and feeding out the red-hot wire is now rolled over the table on a track, one rail of which is on each edge of the table. The first roller smooths and spreads the glass, the second presses deep into the glass the wire netting which slides down an inclined iron table before the roller, the third and fourth rollers complete the process of smoothing and hardening. The sheet of glass is then rough and translucent. It is then taken and polished so that there is an absolutely smooth surface made, and the result is a beautiful, clear plate glass. It is made not only plain and polished, but also rough and figured with prismatic, ribbed, and fancy designs introduced. A number of patents have been taken out to insert the wire netting between two layers of plate glass, and at the present time a great many thousand feet of wire glass are being turned out every day. It is really one of the most important inventions in the building of fireproof buildings and in every large conflagration has rendered a good account of itself, so that set in metal sashes or framing it is now considered indispensable in building. In fact, many fire engineers prefer wire-glass windows to metal shutters. Wire glass is also employed in street-railway cars and has reduced the amount of injuries in cases of accidents from flying glass. Wire glass is not readily damaged by vibrations and is hail-proof. Its strength enables it to support great weights of snow and to resist flying particles that would break through ordinary glass.

Annealing has been referred to already, but it is such an essential part of the art of glass-making that it requires more detailed explanation. In order that glass shall have strength and durability, it must, after it has been fashioned into shape by some process, be cooled more gradually than is possible in the temperature of the open air. This is necessary in order that the pores, which have been distended by heat, may contract evenly throughout the substance instead of closing more rapidly on the surface than inside. In order to effect this, annealing ovens are used in which the temperature is so regulated that the cooling proceeds with extreme slowness, as many as four weeks being required to bring optical glass to its normal temperature. Two kinds of annealing ovens are in use, the intermittent and the continuous. An intermittent kiln is simply a gas-heated oven with a hearth on which the glass is laid. When the heated kiln is filled with ware, it is sealed up and allowed to cool by drafts, which are so regulated that the temperature can be perfectly controlled at every step of the process. In annealing plate glass there is a separate oven for each sheet. Continuous kilns, or "leers," are displacing the intermittent kilns for many forms of glass. The oven is a long narrow passage with the fire at one end, so that the temperature constantly lowers as the other end is approached. An endless chain, with pans on it for holding the glass, is slowly dragged through the oven, and by the time a pan has traveled from the fire to the cold end of the oven the glass in it is properly annealed.

Several processes for rendering glass still tougher than it is made in the annealing oven have been invented. M. de la Bastie has succeeded in imparting considerable toughness to glass by plunging it, while hot, into a bath of oil or melted fat. This process has proved only partially successful, and is not adapted to windowpanes, because glass treated in this way will not cut with the diamond. Another method is in the manufacture of "Verbundglas," or compound glass, which was originated at the works of Schott and Genossen, at Jena, Germany. The glass is made of two layers which expand at different temperatures, one of them being flashed over the other. This glass is especially adapted for chemical vessels, thermometers, lamp chimneys, or, in fact, for any use in which the exterior and interior surfaces are subjected to widely different temperatures. The Jena special glasses and the French (tonnelot) "verre pur" are now used for high-temperature thermometers and show little or no plasticity even at temperatures of 500° C. (932° F.).

There are many strange uses of glass. Threads may be drawn on a reel from molten glass, making a transparent mineral silk fine enough to weave into cloth or to fashion into fancy plumage. It has been found possible to weave glass into fabrics, sometimes with a warp of silk, and to shape it into collars, neckties, brushes, lamp wicks, etc. M. Dubus Bonnet, of Lille, France, invented a process of spinning and weaving glass into cloth. The warp is composed of silk, forming the groundwork, on which the pattern in glass appears, as effected by the weft. The requisite flexibility of glass thread for manufacturing purposes is due to its extreme fineness, as not less than from 50 to 60 of the original strands form one thread. This fashion had but a short vogue, and the fine particles likely to be separated from the fibres were likely to have an unwholesome effect on those inhaling them. *Mineral wool* is made from the slag-glass refuse of iron smelting, being blown into fine shreds by a blast, to fill walls and floors with a fireproof and rat-proof padding, and for other unique services, as well as in chemical laboratories. *Réamur's porcelain* is an opaque and porcelain-like glass, which has been "devitrified" by great heat and gradual cooling, becoming marvelously tough. *Soluble glass* is a highly alkaline solution of minerals composing glass, which is applied to textures in theatres and elsewhere to render them fireproof. Fire touching them melts the invisible minerals into a glaze which excludes air and prevents combustion. M. de la Bastie introduced into Europe transmuted glass, which had not been annealed, but which, by retaining some of the internal conditions of strain, was tougher than cast iron. The process, however, did not secure commercial success. *Malleable glass* is one of the legends descending from the ancients which may be some day verified. See Enamel.

Bibliography. Among the authorities on glass are: for the history of the art, Gaudy, *Romance of Glass Making* (London, 1898); for the scientific side, Powell, Chance, and Harris, *The Principles of Glass Making* (ib., 1883); Hovestadt, *Jena Glass and its Scientific Industrial Appliances* (New York, 1902); and Rosenhain, *Glass Manufacture* (ib., 1912); Austin, report on glass in *Twelfth Census of the United States* (Washington, 1902); and volumes on manufactures in later issues of United States census. Consult also: Dillon, *Glass* (London, 1907); Duthie, *Decorative Glass Processes* (New York, 1908); Bate, *English Table Glass* (ib., 1913); Nelson, *Ancient Painted Glass in Europe* (ib., 1913); Saint and Arnold, *Stained Glass of the Middle Ages in England and France* (London, 1913); Bushnell, *Storied Windows* (New York, 1914).

GLASS, Carter (1858–). An American legislator, born at Lynchburg, Va. He was educated in public and private schools of his native town, learned the printing trade, and worked eight years in the mechanical department of a printing office. He became proprietor of the *Daily News* and the *Daily Advance*, morning and evening papers of Lynchburg. From 1899 to 1903 he was a member of the Virginia Senate and in 1901 a member of the State Constitutional Convention. Beginning in 1902, he served in the United States House of Representatives. He was sponsor in the House for the banking bill (see Bank, Banking), known popularly as the Owen-Glass Bill, enacted into law in 1912.

GLASS, Montague (Marsden) (1877–). An American story-writer. He was born at Manchester, England, was educated at the College of the City of New York and at New York University, and entered the practice of law. After 1900 he became known as contributor to *Munsey's*, *McClure's*, *Harper's Weekly*, the *Saturday Evening Post*, and other magazines. He is known principally as author of *Potash and Perlmutter* (1910), a collection of unusually diverting stories of the Jewish wholesale clothing trade in New York City. As dramatized, it had a long run (1913–14). Other books by this author are *Abe and Mawruss* (1911); *Elkan Lubliner, American* (1912); *Object: Matrimony* (1912).

GLASS, Soluble. See Water Glass.

GLASSBRENNER, glås′brĕn′ẽr, Adolf (1810–76). A German humorous and satirical writer, born in Berlin. From 1831 to 1833 he was editor of the Berlin periodical *Don Quixote*, which in the latter year was suppressed by the ministry. He first became known through his series, *Berlin wie es ist und—trinkt* (33 parts, 1832–50), which originated the Berlin local type of popular humor, much imitated by others. His best work is the comic epic *Neuer Reineke Fuchs* (1846; often reprinted). From 1858 until his death he edited the *Berliner Montagspost.*

GLASSCHORD, glås′kôrd′. A musical instrument, with keys like a pianoforte, but with bars of glass instead of strings of wire. It was invented in Paris in 1785 by a German called Beyer. The name "glasschord" was given to the instrument by Franklin. When the glasschord was completed it was exhibited publicly in Paris and performed on by the inventor; but it never was received with favor by the instrument makers, so that no more were ever made. See Harmonica. Consult K. F. Pohl, *Zur Geschichte der Glasharmonika* (Vienna, 1862).

GLASS CLOTH. See Glass Paper.

GLASS CRAB. A larval form of certain macrurous decapoda (q.v.). They were formerly ranked as a separate group of crustaceans. They are remarkable for the transparency of their bodies, whence their name. They have little resemblance to crabs. The head is represented by a large oval plate, bearing eyes mounted on very long stalks; a second plate, the breadth of which much exceeds its length, represents the thorax and bears the feet, most of which are long, and some of them, as in other crustaceans, bifid, with one branch much longer than the other. The abdomen is small. These creatures have no special organs of respiration, but the blood is aërated through the general surface of the body. They are found in tropical and subtropical seas; and so transparent are they that when floating on the surface of the water they would not be perceived but for the beautiful blue of their eyes.

GLASSE, glås, Hannah. The author of *The Art of Cookery* (1747). "Mrs. Glasse, Cary Street," is mentioned among the subscribers to the first edition, which was published anonymously, and in the fourth edition (1770) is an advertisement of "Hannah Glasse, Habit Maker to H. R. H. the Princess of Wales, in Tavistock Street, Covent Garden." Practically nothing else is known of her. *The Art of Cookery Made Plain and Easy* is ascribed to Dr. John Hill in Boswell's *Johnson*, but this is improbable. Mrs. Glasse wrote *The Compleat Confectioner* (c.1770) and *The Servants' Directory, or Housekeeper's Companion* (1770). The famous direction, "First catch your hare," although often referred to *The Art of Cookery*, is not to be found there. She says, "Take your hare when it is cased."

GLASS EYE. The wall-eyed pike (*Stizostedion vitreum*). See Pike Perch.

GLASSITES, glăs′īts. See Sandemanians.

GLASSON, glȧ′sôɴ′, Ernest Désiré (1839–1907). A French jurist, born at Noyon. He was educated at Strassburg, was admitted to the bar in 1860, and, after teaching a year at Strassburg, went to Nancy in 1865 as a member of the new legal faculty. In 1867 he became an instructor in the University of Paris and in 1899 dean of the faculty of law. He did much to popularize the study of comparative legislation. His works include: *Du consentement des époux au mariage* (1866); *Eléments du droit français dans ses rapports avec le droit naturel et l'économie politique* (2d ed., 1884); *Le mariage civil et le divorce* (1879); *Histoire du droit et des institutions de l'Angleterre* (1881–83), which received a prize from the Institute; *Le code civil et la question ouvrière* (1886); *Histoire du droit et des institutions de la France* (1887–96). Glasson was legal editor of *La Grande Encyclopédie* and was elected to the Académie des Sciences Morales et Politiques in 1882. Consult Girodon's sketch in *La Grande Encyclopédie* (Paris, 1885–1903).

GLASS PAPER, or Cloth. An abrasive surface made by powdering glass more or less finely and sprinkling it over paper or calico still wet with a coat of thin glue; the powdered glass adheres as it dries. Glass paper is very extensively employed as a means for polishing metal and woodwork and is sold in sheets.

GLASS′PORT. A borough in Allegheny Co., Pa., 10 miles south of Pittsburgh, on the Pittsburgh and Lake Erie Railroad, and on the Monongahela River (Map: Pennsylvania, B 7). The surrounding region abounds in coal, and there are manufactories of axes and tools, steel hoops, foundry products, spikes and rivets, glass, etc. Pop., 1910, 5540.

GLASS SAND. A sand used in the manufacture of glass. It is obtained from quartzites and sandstones by crushing them to the desired fineness, or from deposits of sand. If the latter is employed, it is sometimes put through a washing process to remove impurities, such as clay, mica, or iron grains. Silica is the chief constituent of glass sand, and impurities such as iron oxide, alumina, titanium oxide, lime, and magnesia should be present in but small amounts, as shown by the analyses given herewith. Some persons believe the injurious effects of alumina and magnesia are overestimated.

CONSTITUENTS	I	II	III	IV
SiO_2	99.95	97.50	99.46	97.705
Al_2O_3	.30	1.50	.48	.755
Fe_2O_3	....	.50	....	.15
CaO	.13	....	.06	.955
MgO	tr.	.50	....	.442

I, sand, Ottawa, Ill.; II, crushed sandstone, Massillon, Ohio; III, crushed Cambrian quartzite, Cheshire, Mass.; IV, Tertiary sand, Hanover, N. J.

The grains of glass sand may be either rounded or angular, but approximate uniformity of grain is desirable and should range between 30 and 120 mesh. If larger than 30 mesh, the sand is difficult to fuse; if finer than 120 mesh, it is said to "burn out" in the batch. Following are sieve tests of several:

LOCALITY	Sample	Passes 20 mesh	Passes 40 mesh	Passes 60 mesh	Passes 100 mesh
Ottawa, Ill.	Finest grain	100%	100%	92%	25%
" "	Coarsest grain	99%	6%	1%	0%
Gray's Summit, Mo.	Crude	100%	88%	55%	1%
	Finished	100%	92%	25%	2%

Glass sand is obtained from a number of different geological formations, ranging from Cambrian to Pleistocene. The Pleistocene and most of the Cretaceous and Tertiary deposits are sand, but the Cambrian to Carboniferous ones are sandstone or quartzite and have to be crushed before use. Pennsylvania and Illinois are the most important producing States. The glass sand produced in the United States in 1912 amounted to 1,465,386 short tons, valued at $1,430,471. Consult: Ries, *Economic Geology* (3d ed., New York, 1910)—contains also many references; Merrill, *Non-Metallic Minerals* (ib., 1910); *United States Geological Survey, Mineral Resources for 1909*—many analyses.

GLASS SNAIL. A very small, almost transparent snail of the genus *Vitrina*, species of which are common in the northerly United States. These glassy snails are remarkably hardy in reference to cold and consequently are found higher up on mountains than most snails are able to live.

GLASS SNAKE. See Blindworm.

GLAS′TONBURY, gläs′'n-bĕr-ĭ *or* gläs′tŭn-bĕr-ĭ. A market town and municipal borough in Somersetshire, England, situated on a peninsula formed by a winding of the river Brue, 25 miles southwest of Bath (Map: England, D 5). It has some manufactures, an export trade, and in the vicinity are chalybeate springs which formerly attracted health seekers. Pop., 1891, 4119; 1901, 4016; 1911, 4250; the area of the municipal borough is 5019 acres. Its chief material interest lies in the ruins of its splendid abbey founded in the twelfth century. Of this magnificent pile, which covered 60 acres, the only remains are parts of the abbey church, with the roofless chapels of St. Joseph and of St. Mary, and the Abbot's Kitchen, a square, massive, and strongly buttressed structure, all especially important as specimens of early and transitional architecture, and the abbey barn and the porter's lodge. A causeway across Sedgemoor and many of the houses of the town are built from the materials of the abbey, which became a common and prolific quarry for the neighborhood. Other buildings and places of interest are the George Inn, a pilgrims' hostelry of the fifteenth century; the two parish churches, the Tribunal, Wearyall Hill, and the Tor, 500 feet high, from which a fine view is obtained. Two miles to the southwest lies Sharpham Park, where Fielding the novelist was born.

Glastonbury has prehistoric remains of a lake village of considerable extent. At Glastonbury is said to have been situated the first English Christian church, a little wattled building erected by Joseph of Arimathea, the leader of the 12 Apostles sent by St. Philip to Christianize Britain. Tradition states that Joseph established himself here, owing to his pilgrim's staff, which he planted on Wearyall Hill while he rested, taking root. From it sprang the celebrated "Glastonbury thorn," the *Cratægus pre-*

cox, which, according to popular superstition, blossomed every Christmas Day. It was fanatically destroyed by a Puritan during the Cromwellian period, but grafts exist which maintain the traditional blossoming. The traditional site of the original tree is marked by a stone, inscribed I. A. A. D. XXXI. Joseph was succeeded, a century later, by two missionaries who established a fraternity of anchorites, which the famous St. Patrick organized under monastic rule three centuries later. Although joined to the land by St. Michael's Tor, the peninsula was first known by the Celtic name *Ynysvitrin* (isle of the glassy water) and later as *Ynys yr Afalon* (isle of Avalon, or of Apples). It is the Avalonian burial place of King Arthur and Queen Guinevere. The modern name is a corruption of Glæstyngabyrig. A legend relates that in the long quest of a lost sow a Glæsting was led to an apple tree by the old church, where, pleased with the place, he and his family settled; hence Glæstyngabyrig (city of the Glæstings).

In the eighth century the Saxon King Ine built and endowed a monastery, which suffered during the Danish invasions, but was restored and added to by another famous prelate, St. Dunstan, a native of Glastonbury and a pupil of the institution, who became abbot in 946. During the tumultuous period of the Norman Conquest, Glastonbury remained unmolested. From 1120 to 1172 the old buildings were replaced by much finer ones, which were scarcely completed when they, with the wicker church, were destroyed by fire on May 25, 1184. Henry II immediately ordered a larger abbey and church of superb proportions and architecture to be built, which were finished about a century after his death. The length of the church was 528 feet. During the foundation excavations the supposed grave of King Arthur was discovered. In 1539, on the refusal of Abbot Whiting to surrender Glastonbury and its treasures, Henry VIII suppressed and dismantled the abbey and hanged the abbot on the Tor. His body was quartered, and his head fixed on the abbey gate. He was canonized by the Roman Catholic church in 1896. The famous old abbey clock is preserved in Wells Cathedral. In 1909 the site of the abbey and the remaining buildings were transferred to the Church of England. Consult: Hearne, *History and Antiquities of Glastonbury* (Oxford, 1722); Wakefield, *The Avalonian Guide* (Glastonbury, 1839); Willis, *Architectural History of Glastonbury Abbey* (London, 1866); Gasquet, *The Last Abbot of Glastonbury* (ib., 1908); *Henry VIII and the English Monasteries* (ib., 1906); Holmes, *Wells and Glastonbury* (New York, 1909); Greswell, *The Early History of Glastonbury Abbey* (Taunton, England, 1909).

GLASTONBURY. A town in Hartford Co., Conn., 7 miles southeast of Hartford, with which it has steamboat connection, on the Connecticut River (Map: Connecticut, E 3). It is an agricultural region, producing tobacco and fruit, and has manufactories of soap, woolen goods, paper, and silverware. Pop., 1900, 4260; 1910, 4796.

GLASTONBURY THORN. See GLASTONBURY, ENGLAND.

GLATIGNY, glȧ'tē̇'nyē̇', ALFRED, or ALBERT (1839–73). A French poet, born at Lillebonne (Seine-Inférieure), son of a carpenter. While still very young, he wrote his first play, and at 17 joined a troupe of strolling actors and wandered with them over northern France and into Belgium. He wrote constantly, with all the faults and failings of an improvisator. He was one of the "Parnassiens" (q.v.). His works include: *Les vignes folles* (1857); *Les flèches d'or* (1864); *Gilles et pasquins* (1872); *Le testament de l'illustre Brizacier* (1873). He was made the subject of a tragedy (1906) by Catulle Mendès. Consult Mendès, *Légende du Parnasse Contemporaine* (Brussels, 1884).

GLATZ, gläts (Bohemian *Kladsko*). The capital of a circle and a fortified town in the Prussian Province of Silesia, situated on the Neisse, among the Sudetic Mountains, 58 miles southwest of Breslau (Map: Germany, G 3). It is commanded by an old citadel, and the right bank of the stream is protected by a strong fort, the Schäferberg, both fortifications dating from 1745. The old ramparts have been demolished, and fine promenades and streets laid out on their sites. Glatz has an old parish church, with the graves of seven Silesian counts, a new Rathaus, a municipal theatre, and a Gymnasium, originally a Jesuit college founded in 1597. The manufactures consist principally of iron products, machinery, furniture, spirits, cigars, shoes, pottery, brushes, lumber, and bricks. Glatz is believed to have been founded by the Bohemians in the tenth century. Pop., 1900, 14,926; 1910, 17,095.

GLAUBER, glou'bẽr, JAN, called POLYDOR (1646–1726). A Dutch landscape painter and etcher. He was born at Utrecht and was a pupil of Berchem and Vilemberg at Haarlem, then of Picard in Paris (1671), and for two years of A. van der Kabel at Lyons. Having gone to Rome, he was much influenced there by Gaspard Poussin, worked afterward in Padua and Venice, and in 1680 went to Hamburg, residing there and in Copenhagen until 1685, when he came to The Hague and settled in Amsterdam, living in the house of Gerard de Lairesse, who often painted the figures in his landscapes. These are kindred in conception and coloring to those of G. Poussin, and are to be found in the Louvre, Munich Pinakothek, and most of the principal galleries of Europe. Of his etchings, the best are a series of 12 plates, two after Poussin, and six others published under the title "La grande Chartreuse."

GLAUBER, JOHANN RUDOLF (1604–68). A German chemist and physician, born at Karlstadt in Franconia. No details regarding his life are known except that he resided for a long time at Salzburg, then at Kitzingen, then at Frankfort-on-the-Main, then at Cologne, whence he removed to Amsterdam in 1648. A complete edition of his works, in seven volumes, appeared at Amsterdam in 1661. An English translation by Parke, in one large folio volume, was published in London in 1689. Glauber improved many industrial processes and discovered the medicinal properties of numerous substances. His name at the present day is chiefly known for his discovery of hydrated sodium sulphate, which he termed *sal mirabile* and regarded as a universal medicine and a cure for all diseases. See CHEMISTRY; GLAUBER'S SALT.

GLAUBER'S SALT. Sodium sulphate, $Na_2SO_4 + 10H_2O$. It is found native as *mirabilite* or *sal mirabile* at various places in Austria, Italy, and Spain, and in the United States in large quantities at Great Salt Lake, Utah. It is also a constituent of mineral waters and exists in small quantities in the blood and other animal fluids. It was originally prepared by

J. R. Glauber in 1658, by treating sodium chloride (common salt) with sulphuric acid. Anhydrous sodium sulphate ("salt cake") is obtained as an intermediate product in the manufacture of soda ash. Glauber's salt is a white crystalline compound, with a bitter saline taste. When exposed to the air, its crystals effloresce, losing most of their water in crystallization and turning into a white powder. Its chief use is as a purgative in medicine, and as such it is largely used in veterinary practice; but it is also largely employed in the production of certain kinds of glass and in fixing lead mordants in dyeing and printing. See Soda.

GLAUCHAU, glou′kou. A manufacturing town in Saxony, Germany, situated on the Mulde, 8 miles north-northeast of Zwickau (Map: Germany, E 3). It contains two old churches, dating from the twelfth and the sixteenth century respectively; two castles of the counts of Schönberg; and a new Rathaus. Among its numerous educational institutions the most prominent is the school of weaving, with a good collection of old textiles; also a technical college. Glauchau is one of the centres of the German textile industry, producing principally woolen and half-woolen goods. It has 24 dye establishments; there are also manufactured machinery, vehicles, paper, timber, and brick. Glauchau is the birthplace of the famous mineralogist Georg Agricola. It is the seat of an American consul. Pop., 1900, 25,677; 1910, 25,155.

GLAUCO′MA (Lat., from Gk. *γλαύκωμα*, opacity of the crystalline lens, from *γλαυκός*, *glaukos*, bluish green; so called from the appearance of the eye in this disease). A disease of the eye, characterized by increased intraocular tension. In addition to primary and secondary glaucoma, a congenital glaucoma is described. According to the rapidity of onset and the severity of the disease, primary glaucoma is divided into inflammatory or congestive, and noninflammatory or simple. The inflammatory type may be acute or chronic. The cause of glaucoma is unknown. The disease has been observed chiefly in old persons, particularly in women, and usually involves the eyes successively. Jews seem predisposed to it. Heredity, gouty and rheumatic diatheses, cardiac and arterial disease, and chronic constipation seem to exert an influence. Persons with hyperopia (see Sight, Defects of) are often afflicted with glaucoma; those with myopic eyes, very rarely. Various forms of excitement, eye strain, improper use of atropine, and other causes of venous congestion of the eyes are mentioned as exciting factors. The essential feature of the disease is the increase of pressure within the eye, the present view being that there is undue retention of fluids within the eye. Acute inflammatory glaucoma may begin with a prodromal stage, in which sight is somewhat obscured by œdema of the cornea, with some dilatation of the pupil and increased tension in the eyeball. A number of these attacks, each followed by increased presbyopia (see Sight, Defects of), are succeeded by the stage of active glaucoma. This is marked by sudden failure of vision, with great pain in the eye, and headache. There are marked increase of tension, cloudiness and insensibility of the cornea; the pupil is oval, fixedly dilated, and often greenish; the iris is dull and changed in color. The conjunctiva is congested, including the space around the cornea. The interior of the eye is cloudy. Recovery takes place with practically a persistence of all these appearances in a slight degree, and from time to time other attacks occur, the eye being left in worse condition after each. Finally the stage of absolute glaucoma is reached—blindness, increase of the changes in appearance noted in the early attacks, increased tension, and in some cases pain at intervals. Degeneration of the eyeball may follow. Cases of unusual severity, resulting in blindness within a few hours, are known as *glaucoma fulminans.* Chronic inflammatory glaucoma differs from the acute only in the mildness of its initial symptoms and the slowness of its course, the final result being the same. *Simple glaucoma* is a very slowly progressing type, with no active symptoms of inflammation, simply the increased tension and gradual failure of vision. *Secondary glaucoma* is an increase of tension, with other symptoms of glaucoma, secondary to other disease of the eye or to injury. *Congenital glaucoma* usually affects both eyes, leading to blindness. In the treatment of glaucoma atropine must never be employed. Eserine and pilocarpine, locally, may give some relief. Iridectomy, an excision of part of the iris, is the most effectual treatment. Sclerotomy, an incision through the sclera or white of the eye, is sometimes employed in its place, but this procedure has been superseded by trephining, which operation consists in removing a small section of the eyeball at the junction of the cornea and sclera and excising a portion of the iris. Consult T. Henderson, *Glaucoma* (New York, 1910), and R. H. Elliot, *Trephining in the Treatment of Glaucoma* (ib., 1913).

GLAUCONITE, gla̤′kȯ-nīt (from Gk. *γλαυκός*, *glaukos*, bluish green), or Green Earth. An iron potassium hydrous silicate. It is found either amorphous in cavities of rocks or in a loosely granular condition. In color it is of various shades of green and is found in Russia, in Belgium, and in various localities in New Jersey and Mississippi in the United States.

GLAUCOPHANE, gla̤′kȯ-phān (from Gk. *γλαυκός*, *glaukos*, bluish green + *φαίνειν*, *phainein*, to appear). A mineral belonging to the amphibole group and crystallizing in the monoclinic system. It is a silicate of sodium, aluminium, iron, and magnesium. The mineral has a vitreous to pearly lustre and is found in various shades of blue. It is a constituent of various crystalline schists, gneisses, and other rocks. It occurs associated with diallage, epidote, mica, garnet, etc., at various points along the Alps in Switzerland, and in Italy; while in the United States it is found on the coast ranges of California. According to Dana, it has been noted as a secondary product due to the alteration of diallage by a process of "glaucophanization."

GLAU′CUS (Lat., from Gk. Γλαῦκος, *Glaukos*). A Lycian prince, who, along with Sarpedon, assisted Priam in the Trojan War. He was the son of Hippolochus and grandson of Bellerophon and was mythical progenitor of the kings of Lycia. When Glaucus and Diomedes met in battle, they discovered that their houses were joined in hereditary friendship, whereupon they exchanged weapons, Glaucus giving his golden armor for the bronze of Diomedes (*Iliad*, vi). The incident became proverbial for an unequal exchange. Later writers say that Glaucus was afterward slain by Ajax; but his body was carried back to Lycia, as that of his brother had been.

GLAUCUS. An artist of Chios, said to have invented the art of soldering iron. His most famous work was a silver vase resting on an iron base, curiously decorated and wrought in his new technique; the vase was dedicated about 605 B.C. by Alyattes II of Lydia to Apollo at Delphi. Consult the article "Glaucus, 46," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912).

GLAUCUS. Son of Minos, King of Crete, and Pasiphaë. On one occasion when a child, while playing at ball or, according to another account, chasing a mouse, he fell into a pot of honey and was smothered. His father, after a long and vain search, consulted the oracle and was told that the person who could suggest the aptest comparison for one of his own cows, which had the power of assuming every day three colors, would restore his son alive. Polyidus, the seer of Argos, who likened the animal to the mulberry and the bramble, was ordered by Minos to find the child and restore it to life. Polyidus found the body of the child, but the latter injunction he was unable to perform, and he was therefore sentenced to be entombed alive with the corpse. Seeing in the tomb a serpent bring back to life its dead companion by laying upon it the leaves of a certain herb, Polyidus conceived the idea of treating the dead boy in the same way. The process proved successful. Then Minos ordered the seer to teach the child the art of prophecy. This also Polyidus did, but immediately deprived him again of all remembrance of his instruction. Consult: Höck, *Kreta* (Göttingen, 1829); Roscher, *Nektar und Ambrosia* (Leipzig, 1883); Gädechens, in Roscher's *Lexikon*, vol. i (Leipzig, 1884 et seq.).

GLAUCUS. The hero of Bulwer's novel *The Last Days of Pompeii.*

GLAUCUS PONTIUS. According to the legend, a fisherman of Anthedon. Through the influence of a magic herb he was changed into a sea god and gifted with unerring prophecy. He is found especially in connection with Nereus and his train and was worshiped not only at Anthedon but on many islands and coasts, as at Delos, Naxos, Corinth. He was especially honored by sailors and fishermen and is often represented in art as wearing a fish basket on his head. In the legends he appears as prophesying to the Argonauts, or as builder and pilot of the *Argo* (consult Ovid, *Met.*, xiii, 904), and his unrequited loves for Scylla and Ariadne were frequent themes among the later poets (e.g., of a satyric play by Æschylus, q.v.). Consult Gädechens, *Glaukos der Meergott* (Göttingen, 1860), and his article on "Glaukos," in Roscher's *Lexikon*, vol. i (Leipzig, 1884 et seq.).

GLAUCUS POTNIEUS. A son of Sisyphus (q.v.) by Merope, and the father of Bellerophon (q.v.). According to the legend he was destroyed by his own mares, the most common form of the story being that he was torn to pieces by them (Vergil, *Georgics*, iii, 267). Accounts differ about the place of his violent death and also concerning the immediate occasion of it. Sometimes it is represented as having happened at Iolcus, at the funeral games of Pelias, but usually the scene is laid at Potniæ, near Thebes. He is most frequently represented as having offended Aphrodite by having kept his mares from breeding; but other versions of the myth are that he had fed them on human flesh to make them more spirited, or that they had been suffered to drink at a sacred well in Bœotia, or that they had eaten the herb hippomanes. He was the subject of a lost tragedy of Æschylus (q.v.). In Corinth this legend is confused with that of Glaucus Pontius (see above), and the same stories are told of both. In fact, it is very probable that the Corinthian Glaucus is only a local variation of the commonly worshiped divinity. Some mythologists (comparing the Greek phrase γλαυκὴ θαλασσά, 'the flashing sea') see in Glaucus Potnieus the quiet gleaming sea, whose calm surface is destroyed by the violent risings of the waves, the wild horses of Glaucus Pontius.

GLAZE. See POTTERY.

GLAZE'BROOK, RICHARD TETLEY (1854–). An English physicist. He was born at West Derby, Liverpool, Sept. 18, 1854, and was educated at Liverpool College and Trinity College, Cambridge, where he graduated with honors in 1876 and was made a fellow in the following year and in 1895 senior bursar. In 1880 he was appointed demonstrator in physics at the Cavendish Laboratory and 10 years later was made assistant director. He was also university lecturer in mathematics at Cambridge and in 1898 and 1899 was principal of University College, Liverpool. In the latter year he was made director of the National Physical Laboratory, a position he has since held. In 1906 he was elected president of the Institute of Electrical Engineers. Dr. Glazebrook received the degree of D.Sc. from Victoria College and Heidelberg and was elected a fellow of the Royal Society. In 1910 he was made Companion of the Bath. Among his more important researches are those dealing with the absolute resistance of the British Association unit and the specific resistance of mercury, a dynamical treatment of the theory of double refraction, a verification of Fresnel's theory of double refraction in a biaxial crystal, and other investigations dealing mainly with optics and electricity. He is the author, with W. N. Shaw, of an excellent *Text-Book of Practical Physics* (1884) and of a *Text-Book of Physical Optics* (1882); *Laws and Properties of Matter* (1893); *Clerk-Maxwell and Modern Physics* (1896); *Electricity and Magnetism* (1903); *Heat and Light* (2 vols., 1910); *Heat: An Elementary Textbook* (1911).

GLAZIER, glā'zhẽr, WILLARD (WORCESTER) (1841–1905). An American soldier, author, and explorer. He was born at Fowler, N. Y., was educated at Gouverneur Seminary and at the Albany Normal School. In 1861 he enlisted in the Second New York Cavalry. In 1863 he was taken prisoner by the Confederates in Virginia and confined in Libby Prison, Richmond, and at Columbia, S. C. His escape to the Union lines was the subject of his first book, *Capture, Prison-Pen and Escape* (1865), of which more than 400,000 copies were sold. He also wrote: *Three Years in the Federal Cavalry* (1870); *Heroes of Three Years* (1878); *Peculiarities of American Cities* (1873); *Down the Great River* (1887); *Headwaters of the Mississippi* (1892); *Ocean to Ocean on Horseback* (1896). The belief that he discovered the source of the Mississippi is without foundation; the body of water (above Lake Itaska) which he called the source has been named Lake Glazier. Consult his life by Owens, *Sword and Pen* (Philadelphia, 1880), and Harrower, *Captain Glazier and his Lake* (New York, 1886).

GLAZUNOV, glȧ'zōō-nôf', ALEXANDER (1865–

). A Russian composer. He was born at St. Petersburg and studied first at the Polytechnic Institute. Conscious of his gift for music, and with the advice of many musical friends and teachers in sympathy with his aims, he determined to devote himself entirely to music. His most important teacher was Rimsky-Korsakoff, who was friend as well as teacher. His first symphony was produced when he was but 16 years of age, and the second three years later, under the auspices of Liszt at Weimar. Paris accorded him a most enthusiastic reception when in 1889 he visited there and conducted in person his second symphony and many minor compositions. He visited London afterward and conducted his fourth symphony at a concert of the London Philharmonic Society. In 1896–97, together with Liadoff and Rimsky-Korsakoff, he conducted the national Russian symphony concerts at St. Petersburg. In 1899 he became professor of instrumentation at the St. Petersburg Conservatory and was its director in 1909–12. He belongs to the school of Tschaikowsky in the national sense and, like him, is occasionally prodigal in brilliant orchestral effects. Not only is he perhaps the most prolific, but also one of the most talented, of modern Russian masters. Together with Rimsky-Korsakoff he completed and orchestrated Borodin's opera *Prince Igor.* His principal works are seven symphonies (in E, F♯m, D, E♭, B♭, Cm, F); five suites; four concert overtures; two serenades; two symphonic poems; a violin concerto in Am; numerous smaller works for orchestra (rhapsodies, fantasies, dances); four cantatas for soli, chorus, and orchestra; several ballets; and much chamber music of unusual merit. Consult A. W. Ossowski, *Alexander Glazunoff: His Life and Works* (St. Petersburg, 1907, in Russian).

GLEANERS, The. See Glaneuses.

GLEA′SON, Frederick Grant (1848–1903). An American composer, born at Middleton, Conn. He was a pupil of Dudley Buck and in 1869 went to Germany, where he studied in the Leipzig Conservatory and later in Berlin and London. In 1875 he returned to the United States, becoming church organist in Hartford and New Britain, Conn., and, in 1877, teacher in the Hershey School of Music, Chicago. Mr. Gleason was elected a fellow of the American College of Musicians, president of the Chicago Musical Society, and president general of the American Patriotic Musical League. He composed two grand operas, *Otho Visconti* and *Montezuma;* a symphonic poem *Edris;* several cantatas; some chamber music; and numerous songs and instrumental pieces.

GLE′BA (Lat., clod). Among the Gasteromycetes (q.v.) the fructification, as, e.g., the puffballs, is differentiated into an outer zone, called the peridium, and an inner mass of tissue, called the gleba. It is the gleba which incloses the spore-bearing cells. The variations in the development of peridium and gleba distinguish the five orders of Gasteromycetes. See Basidiomycetes.

GLEBE (Lat. *gleba,* clod). The land possessed as part of an ecclesiastical benefice or from which the revenues of the benefice arise. The assignment of glebe lands was formerly held to be of such absolute necessity that without them no church could be regularly consecrated. The fee simple of the glebe is held by the law of England to be in *abeyance;* i.e., it is only "in the remembrance, expectation, and intendment of the law"; but after induction, the freehold of the glebe is in the parson, and he possesses most of the powers of a proprietor, with the exception of the power of alienation. Previous to the Reformation the clergy possessed certain powers of alienation at common law; and if a bishop, with the assent of his chapter, or an abbot, with the assent of his convent, or the like, alienated glebe lands, the deed would not have been void, because the fee simple was in the holder of the benefice for the time being; but by 1 Eliz., c. 19, and 13 Eliz., c. 10, it was provided that all gifts, grants, feoffments, conveyances, or other estates made of glebe lands should be utterly void and of none effect. Neither could the incumbent exchange the lands or any portion of them without the authority of an act of Parliament. This restriction was done away by 55 Geo. III, c. 147, for enabling spiritual persons to exchange parsonage or glebe houses or glebe lands for others of greater value or more conveniently situated for their residence and occupation. By 5 and 6 Vict., c. 54, it is now provided that the commissioners appointed to carry into effect the commutation of tithes shall have power to ascertain and define the boundaries of the glebe lands of any benefice, and also power, with consent of the ordinary and patron, to exchange the glebe lands for other lands within the same or any adjoining parish, or otherwise conveniently situated.

In Scotland, as in England, a glebe forms, as a general rule, a portion of every ecclesiastical benefice of the Established church and is thus an addition to the stipend and sometimes a very important one. As in England, the alienation of glebe lands by the incumbent of the parish has from a very early period been forbidden. (Stat. 1572, c. 48.) Consult Phillimore, *Ecclesiastical Laws of the Church of England* (2d ed., London, 1895).

GLEBE LAND. See Church Rates.

GLEDE. A bird. See Kite.

GLEDITSCH, glā′dĭch, Johann Gottlieb (1714–86). A German botanist and writer on forestry, born and educated at Leipzig. After lecturing on botany and materia medica at Frankfort on the Oder for four years, he was appointed professor of botany at Berlin and director of the Botanical Garden in that city. It was, however, in his capacity as professor of forestry at the Berlin academy devoted to that science that he exercised that permanent influence which induced Linnæus to name the genus *Gleditsia,* the honey locust, after him. His chief publication is *Systematische Einleitung in die neuere aus ihren eigentümlichen physikalisch-ökonomischen Gründen hergeleitete Forstwissenschaft* (2 vols., 1774–75).

GLEDIT′SIA. See Honey Locust.

GLEE (AS. *gligg,* music, Icel. *glȳ,* merriment). The English name of a vocal composition for three or more voices, without instrumental accompaniment, and in one or more movements. The style of music of the glee is peculiar to England and quite different from the part songs of Germany or the older madrigal (q.v.), being more extended and laying emphasis on variety rather than unity. The first glees were written by Arne and Boyce about the middle of the eighteenth century. The great composer of glees was S. Webbe, who died in London in 1816. This form flourished particularly in the period from 1750 to 1825. In

1787 the "Glee Club" was founded in London, which cultivated glees with great zeal until it was dissolved in 1857.

GLEET. See GONORRHŒA.

GLEICHENBERG, glīk′*e*n-bĕrk. A watering place of Styria, Austria, 1020 feet above sea level, in a charming, picturesque valley surrounded on three sides by mountains, about 40 miles southeast of Graz, near the Hungarian frontier (Map: Austria, E 3). It is well known for its nonchalybeate saline alkali springs, which are much frequented by sufferers from pulmonary complaints. Large quantities of the water are exported. There are several beautiful châteaux and many villas of the Austrian nobility in the vicinity. Resident population, about 1500.

GLEICHEN-RUSSWURM, glīk′*e*n-ṛus′vṛurm, LUDWIG, BARON VON (1836–1901). A German landscape painter and etcher. He was born at Castle Greifenstein in Bavaria, and studied under Max Schmidt and Hagen at the School of Art in Weimar. Given to realistic treatment from the first, with broad, decided brushwork and excellent handling of light, his style of painting afterward approached closely that of the Impressionists, as may be seen respectively from "An Idyl" (1885), in the National Gallery, Berlin, and an "Evening Landscape" (1892), in the Weimar Museum. Both these galleries have also collections of his water colors. His etchings are among the best produced in Germany during the later nineteenth century. He was a grandson of Schiller. Consult the monograph by Freuzel and Lehr (Vienna, 1902).

GLEIG, glēg, GEORGE (1753–1840). A Scottish divine, Bishop of Brechin, and primus of the Episcopal church of Scotland. He was born on a farm at Boghall, Kincardineshire, was educated at King's College, Aberdeen, was ordained in the Scottish Episcopal church in 1773, and took charge of a congregation at Pittenweem, Fifeshire, removing thence to Stirling in 1787. He contributed to the *Monthly Review*, the *Gentleman's Magazine*, and other publications, and wrote for the third edition of the *Encyclopædia Britannica*, of which, after the death of Colin Macfarquhar, proprietor and editor, in 1793, he edited the last six volumes, and in 1801 a supplement. He was twice elected Bishop of Dunkeld, but Bishop Skinner, the primus of the Scottish church, whom Gleig had criticized in the *Gentleman's Magazine*, prevented his taking office. In 1808, having acceded to the tests imposed by Bishop Skinner, he was chosen successor to Bishop Strohan, of Brechin. His efforts towards securing a strict adherence to the English liturgy, with the single exception of the communion, were eminently successful. In 1816, when elected primus of the Church of Scotland, he tried to extend the reforms begun in his own episcopate and to cement the alliance with the English church. He was not altogether successful, for his persistent interference in diocesan elections alienated some of his strongest supporters. He resigned the primacy in 1837. He published several volumes of sermons, *The Life and Writings of William Robertson* (1812), and *Directions for the Study of Theology* (1837); and edited Stackhouse's *History of the Bible* (1817). Consult Walker, *Life of the Right Reverend John Gleig, Bishop of Brechin* (Edinburgh, 1878).

GLEIG, GEORGE ROBERT (1796–1888). A Scottish writer, born at Stirling, son of the preceding. In 1812, while a student at Oxford, he joined a regiment on its way to London and served in the Peninsular campaign. During the American War of 1812–14 he participated in the movement against the city of Washington and was severely wounded in the battle of Bladensburg. In 1821 he published an account of the *Campaigns of the British Army at Washington and New Orleans.* After the war he returned to Oxford, entered holy orders, and was presented to the living of Ivy Church, Kent. In 1825 he published *The Subaltern*, an entertaining and well-written novel founded on his experience in the Peninsular War. In 1834 he became chaplain of Chelsea Hospital and in 1844 chaplain general of the forces. Having devised a scheme for the education of soldiers, in 1846 he was appointed inspector general of military schools. Gleig contributed to *Fraser's*, *Blackwood's*, the *Edinburgh*, and the *Quarterly;* and wrote a great variety of biographical, historical, and religious books. The most interesting is his *Life of the Duke of Wellington* (1862). His *Life of Warren Hastings* (1841) was the text for Macaulay's *Essay on Warren Hastings.*

GLEIM, glīm, JOHANN WILHELM LUDWIG (1719–1803). A German poet whom the glories of Frederick II's struggle in the Seven Years' War inspired to write the 16 vigorous and thrilling *Lieder eines preussischen Grenadiers* (1758). He was called "Father Gleim" because he assisted many of the younger poets. Gleim was born at Ermsleben, near Halberstadt, and was the most prominent of the early political song writers of Germany. His other songs, fables, romances, classical and mediæval imitations, are, with few exceptions, as unimportant as his didactic epic *Halladat* in Oriental garb (1774), being at their best feebly pretty and at their worst very dull. He died at Halberstadt. Gleim's *Works* are in seven volumes (1811–13). For his life, consult Körte (Halberstadt, 1811).

GLEIWITZ, glī′vĭts. A town in the southeastern part of the Prussian Province of Silesia, situated on the Klodnitz and the Klodnitz Canal, 100 miles by rail southeast of Breslau (Map: Germany, H 3). It has an old Catholic church. A Gymnasium, a mechanical school, an ironworking school, and a museum are among its institutions. It has a royal foundry and hearths; manufactures machinery, boilers, wire, agricultural machinery, paper, glass, oil, lumber, chemicals, cabinetwork, and piping. Gleiwitz dates from the twelfth century. Pop., 1900, 52,362; 1910, 66,910, mostly Roman Catholics.

GLENAR′VON. Lady Caroline Lamb's first novel, published anonymously in London in 1816. Its caricature of Byron, with whom the author had had a short love affair and a quarrel, soon made the book famous. It was reprinted in 1865.

GLENCOE, glĕn-kō′. A deep, precipitous valley, in northern Argyllshire, Scotland. It extends southward from Loch Leven, is about 8 miles in length, and is divided into an upper and a lower valley. It is famous for the wildness and sublimity of its scenery and for the massacre of Glencoe. The Highlanders, faithful to the Stuart dynasty, were promised full pardon if on or before Dec. 31, 1691, they submitted to the rule of William III and Mary. The surrender of Mac Ian, chief of the Macdonalds of Glencoe, was delayed by bad weather until January 7. The sheriff at Inveraray, yielding to his entreaties, accepted his oath on that day, but at Edinburgh the clerks refused to receive it. With these circumstances unknown to the King, Mac Ian's enemies, headed by Sir John Dalrymple, Master of Stair, obtained a royal warrant for their extirpation. Under the guise of friends, 120 men, mostly Campbells and hereditary foemen, led by Captain Campbell of Glenlyon, accepted the hospitality of the Macdonalds for 12 days, then treacherously attacked them at five o'clock in the morning of Feb. 13, 1692. Thirty-eight persons, including children and women, were slain. About 300 men and women escaped in a violent storm, but many perished from cold and hunger in the snow of the mountain gorges. Consult: Macaulay, *History of England* (3 vols., New York, 1908); Charles Leslie, *The Massacre of Glencoe, Being a Reprint of a Contemporary Account*, ed. by E. Goldsmid (Edinburgh, 1885); George Gilfillan, *The Massacre of Glencoe and the Campbells of Glenlyon* (Stirling, 1913).

GLENCOE. A city and the county seat of McLeod Co., Minn., 51 miles west-southwest of Minneapolis, on the Chicago, Milwaukee, and St. Paul Railroad, and on Buffalo Creek (Map: Minnesota, C 6). It is surrounded by a farming and dairying region, and has grain elevators, flour mills, a foundry, machine shops, a creamery, etc. Stevens Seminary is located here. The water works are owned by the city. Pop., 1900, 1780; 1910, 1728.

GLENCOE, or The Fall of the McDonalds. A drama by Sir Thomas Talfourd, produced in 1840 by Macready.

GLEN′CORSE, Lord. See Inglis, John, Lord Glencorse.

GLEN COVE. An unincorporated village in Nassau Co., N. Y., 28 miles northeast of Brooklyn, on the Long Island Railroad and on an inlet of Long Island Sound (Map: New York, B 3). It is the seat of a Friends' Academy and has three fine public school buildings and a public library. It has manufactories of leather belting, but is essentially a residential place. It was settled in 1668. Pop., 1914 (local est.), 7500.

GLEN′DALE. A city in Los Angeles Co., Cal., 7 miles north of Los Angeles, on the Pacific Electric and the San Pedro, Los Angeles, and Salt Lake railroads. It contains a branch of the Battle Creek Sanitarium, a Carnegie library, and a fine high-school building. The city is situated in a rich fruit-growing country, producing chiefly oranges and olives. The electric-light plant is owned by the municipality. Pop., 1910, 2746.

GLENDALE, Battle of. See Frazier's Farm, Battle of.

GLEN′DIVE. A city and the county seat of Dawson Co., Mont., 78 miles by rail northeast of Miles City, on the Yellowstone River, and on the Northern Pacific Railroad (Map: Montana, M 2). The city contains three hospitals and a poor farm. It has railroad repair shops, and carries on an important trade in live stock and wool. Extensive deposits of lignite are found in the adjacent region. The water works and electric-light plant are owned by the city. Pop., 1910, 2428.

GLENDOWER, glĕn-dōōr′ *or* dou′ẽr, Owen (?1359–?1416). A Welsh chief, claiming descent from Llewellyn and prominent as an opponent of the English during the reign of Henry IV. He was the last to claim the title of independent Prince of Wales. At first he was a follower of Henry of Lancaster, who succeeded Richard II in 1399, but local troubles forced him into opposition. The Welsh were strongly attached to Richard II and, moved by rumors that Richard was still alive, rose in revolt against Henry (1400). Glendower led this movement and was at first very successful. The King ordered his subjugation and granted his estates to the Earl of Somerset. Though Glendower's forces were inferior in number to those of his adversaries, he was sometimes victorious, chiefly through surprise, ambushes, and the like. Often, however, he was defeated and forced to retire to the hills. In 1402 he drew Lord Grey into an ambush and took him prisoner. A few weeks later Sir Edmund Mortimer, the uncle of the Earl of March, was captured by Glendower, after a battle won by the latter. Treason seems to have been falsely imputed to Mortimer as the cause of his defeat; but Henry IV's suspicions and Glendower's kindness soon made the treason sufficiently real, for Mortimer married one of Glendower's daughters and conspired with him against the English King. At this time Glendower styled himself openly Prince of Wales. In July, 1404, Glendower entered into a treaty with Charles VI of France against the English. Little came of it, for in the following year Glendower sustained severe reverses. For two or three years more his fortunes were somewhat in the ascendant, and then they sank to the ordinary level of the petty warfare of a barbarous mountain chief. On Feb. 24, 1416, Glendower was still alive, but nothing is known about him after that date. His successes show that he had about the highest talents of his class, and he had their faults also. The popular idea of him is to be found in Shakespeare's *King Henry IV*. From the first he has been a kind of mythical hero, and the lapse of centuries does not clear up the exact facts of his history. He was the last champion of Welsh independence which the English kings had been steadily stamping out for nearly a century and a half. Consult: Pennant, *Tour in Wales* (London, 1778); Pauli's *Geschichte von England* (Hamburg, 1854–58); Wylie, *History of Henry IV, 1394–1404* (London, 1889–98); Bradley, *Owen Glyndwr: The Last Struggle for Welsh Independence* (New York, 1901).

GLENELG′. A shallow river, 260 miles long, rising in the southwestern part of Victoria (Map: Victoria, A 5). It crosses the boundary into South Australia and enters Discovery Bay, a bight of the Indian Ocean, between Cape Northumberland on the west and Cape Bridgewater on the east. In the rainy season it is subject to heavy floods.

GLENELG, Lord. See Grant, Charles.

GLENGAR′RY. A beautiful valley or glen in West Inverness-shire, Scotland, about 8 miles southwest of Fort Augustus (Map: Scotland, D 3). It takes its name from the Garry River, which takes a winding course through it for some 19 miles. This valley was the home of the Macdonnells from the beginning of the sixteenth century until the death of the last of the acknowledged chief's family in the early part of the nineteenth century. Scott is said to have taken the last chief of this family, Col. Alexander Ranaldson Macdonell, as his model for Fergus MacIvor in *Waverley*. The Glengarry cap was named from this valley.

GLENN, John Mark (1858-). An American sociologist. He was born at Baltimore, Md., and was educated at Washington and Lee University (M.A., 1879), Johns Hopkins University, and the University of Maryland (LL.B., 1882). From 1898 to 1907 he was a member (president, 1904–07) of the supervisors of city charities of Baltimore. In 1907 he became director of the Russell Sage Foundation of $10,000,000 to be used to improve social and living conditions. He was a vice president of the American Statistical Association in 1909–10.

GLEN′NON, John Joseph (1862-). An American Roman Catholic prelate, born at Kinnegad, County Westmeath, Ireland. He studied at St. Mary's College, Mullingar, graduated from All Hallows College, Dublin, in 1883, and was ordained a priest in 1884. He served as an assistant pastor of St. Patrick's Church at Kansas City in 1884–87 and as pastor of the cathedral of that city under Bishop Hogan; was vicar-general of the diocese in 1892–94 and administrator of the diocese in 1894–95; became Coadjutor Bishop of Kansas City and Bishop of Pinara in 1896; and Coadjutor Archbishop of St. Louis in 1903, and later in the same year Archbishop. In 1914 the city of Drogheda, Ireland, presented Archbishop Glennon with the freedom of the city.

GLEN RIDGE. A borough in Essex Co., N. J., 4 miles from Newark, on the Delaware, Lackawanna, and Western and the Erie railroads (Map: New York City (Greater New York), A 4). It is a purely residential community and contains the Mountainside Hospital and a public library. The water works are owned by the borough. Pop., 1900, 1960; 1910, 3260.

GLENROY′. A narrow, rocky glen of Inverness-shire, Scotland, through which flows the Roy. After a course of about 15 miles this stream joins the Spean at Keppoch. The glen is remarkable for three terraces running round it, everywhere horizontal and parallel to each other, and known as the "parallel roads of Glenroy." The highest is about 1150 feet above sea level. The second is 80 feet lower; the third lies about 855 feet above sea level and may be traced round the mountain of the glen into the valley of the Spean. The subject of much scientific study and discussion, they are now conceded to be ancient shore lines of a glacial lake, which halted for a while at the three levels in the process of the return to a normal drainage.

GLENS FALLS. A city in Warren Co., N. Y., 40 miles (direct) north of Troy, on the Hudson River, the Champlain Canal, and on the Delaware and Hudson Railroad (Map: New York, G 4). It derives its name from the falls in the Hudson, which supply exceptional power for manufacturing; and the island below the falls is associated with Cooper's *Last of the Mohicans.* The region abounds in points of interest connected with the French and Indian and the Revolutionary wars. There are large quarries of limestone, extensive lime works, Portland-cement works, a number of saw and planing mills, brickworks, and manufactories of paper, shirts, collars, shirt waists, etc. The city has the Crandall Free Library, St. Mary's and Glens Falls academies, a home for aged women, the Parks and Glens Falls hospitals, Crandall Park, and a great iron bridge over the falls. The city owns and operates its water works. Glens Falls was settled in 1763, incorporated as a village in 1837, and reincorporated as a city in 1908. In 1864 it was almost completely destroyed by fire and again in 1884 was visited with a similar disaster, which necessitated the rebuilding of the southern part of the city. Pop., 1900, 12,613; 1910, 15,243; 1914 (U. S. est.), 16,362.

GLEN′WOOD. A city and the county seat of Mills Co., Iowa, 20 miles south by east of Council Bluffs, on the Chicago, Burlington, and Quincy Railroad (Map: Iowa, B 3). It is the seat of the State Institution for Feeble-Minded Children and contains a public library and fine city park. The city, besides being the centre of important corn and live-stock interests, is in a highly productive fruit-growing country and has a large canning factory and granite works. The water works are owned by the municipality. Pop., 1900, 3040; 1910, 4052.

GLENWOOD SPRINGS. A city and the county seat of Garfield Co., Colo., 126 miles (direct) southwest of Denver, on the Colorado Midland, and the Denver and Rio Grande railroads and on the Grand River (Map: Colorado, B 2). It is in a cattle-raising, coal-mining, fruit-growing, and a general farming region and is widely known as a health resort. Among its attractions are numerous hot springs, vapor caves, an open-air swimming pool which affords bathing in winter and in summer, and superb mountain scenery. Pop., 1900, 1350; 1910, 2019.

GLEVUM. See Gloucester, England.

GLEYRE, glâr, Charles (1806–74). A French historical painter. He was born at Chevilly, Canton Vaud, Switzerland, was brought up at Lyons, and studied four years with Hersent in Paris. Later he studied the old masters in Italy and traveled extensively in the Orient, sketching land and people after nature. His first work at the Salon appeared in 1840, but he did not obtain marked success until in 1843 he exhibited "Evening," also called "Lost Illusions," now in the Louvre. Among his other works are the "Departure of the Apostles" (1845), in the church at Montargis; "Pentecost," in Ste. Marguerite, Paris; the "Execution of Major Dave" and the "Romans Passing under the Yoke of the Helvetians," in the Lausanne Museum; "Pentheus Pursued by Mænads" and the "Charmer," in the Basel Museum. Gleyre's genius was refined and sensitive, and his works were executed with conscientiousness and sincerity; but they are not exempt from the dryness and coldness of the academic style. He opened an important studio in Paris, and among his pupils were many men afterward well known in the world of art. Gleyre died suddenly, May 5, 1874, while visiting the Alsace-Lorraine Exhibition at the Palais Bourbon. For his biography, consult: Clement (Paris, 1878); Berthoud (Lausanne, 1880); Mantz, in *Gazette des Beaux-Arts* (Paris, 1875); Cook, *Art and Artists of our Time,* vol. i (New York, 1888).

GLICHEZARE, Heinrich der. See Heinrich der Glichezare.

GLID′DON, George Robins (1809–57). An English archæologist, Egyptologist, and ethnologist, born in Devonshire. When very young, he was taken to Egypt by his father, who was a merchant residing at Alexandria and also United States Consul. During Gliddon's long residence in Egypt, in the course of which he served for some time as United States Vice Consul, he devoted much time to the study of Egyptian antiquities. Later he came to America and lectured on this subject in Boston, New York, and Philadelphia. His lectures did much to attract popular interest to Egyptology and its results. At the time of his death in Panama he was agent for the Honduras Interoceanic Railway. He wrote: *A Memoir on the Cotton of Egypt* (1841); *An Appeal to the Antiquaries of Europe on the Destruction of the Monuments of Egypt* (1841); *Discourses on Egyptian Archæology* (1841); *Ancient Egypt* (1850; new ed., 1853); *Types of Mankind*, written in conjunction with Dr. J. C. Nott and containing contributions from Agassiz, Dr. Samuel G. Morton, and others (1854); *Indigenous Races of the Earth*, also written in conjunction with Dr. Nott and containing contributions from Alfred Maury, librarian of the French Institute; Francis Pulszky, the Hungarian ethnologist; and Professor Meigs, of Philadelphia (1857).

GLIÈRE, glê-âr′, Reinhold Moritzovitch (1875–). A Russian composer, born at Kieff. He studied at the Conservatory of Moscow under Tanieff and Ippolitoff-Ivanoff from 1894 to 1900. His striking inventive power and conciseness of expression soon gained him general recognition both in Europe and in America. With marked predilection he cultivates the purely instrumental forms. His compositions include two symphonies, in E flat and C minor; three string sextets; and two string quartets.

GLINKA, glēn̲′kȧ, Feodor Nikolaévitch (1786–1880). A Russian soldier and man of letters. He was born at Smolensk and was educated for the army. In 1803 he became an officer and in 1805 fought at Austerlitz. At the close of the campaign he left the service and devoted himself to study and travel about Russia. Upon the invasion of the French in 1812 he reëntered the Russian army and remained in active service until the end of the campaign in 1814. When Count Milarodovitch became military governor of St. Petersburg, Glinka was appointed colonel under his command. In 1826, on account of his alleged connection with a political conspiracy, he was banished to Petrozavodsk. After some time he was pardoned, again took up his residence at St. Petersburg, and became Councilor of State. He wrote: *Letters of a Russian Officer in the Campaigns of 1805–06* (1815–16; 2d ed., 1870); a poetical translation of the Psalms, of the Prophets, and of the Book of Job; *Reminiscences of the Year 1812;* a poem, "Kareliya"; and several other things full of mysticism, which possessed his mind after 1853.

GLINKA, Mikhail Ivanovitch (1804–57). A celebrated Russian composer of the early modern school. He was born at Novospaskoi, near Smolensk, of aristocratic parents, and consequently received the education of a young noble of the period. His earlier musical teachers were Böhm (violin), Carl Mayer (theory and pianoforte), and later Field; subsequently he spent four years in Italy, ostensibly for his health, but practically completing his musical education. After studying for a little while with Dehn, of Berlin (1834), he was led to attempt composition, the result being the first Russian national opera, *A Life for the Czar* (1836), which received its first performance at St. Petersburg. While the musical treatment of the opera on the whole is Italian to a degree, it is occasionally very Russian in its coloring, which, together with its purely Russian plot and the employment of Russian folk songs, has earned for its composer the reputation of being the pioneer of the modern Russian school and the forerunner of the famous national composer Tschaikowsky. His success gained for him the appointment of Imperial chapelmaster and conductor of the opera at St. Petersburg. The second opera, first presented at St. Petersburg in 1842, was arranged from a poem of the Russian poet Pushkin and was entitled *Russlan and Ludmilla.* In character it is very similar to the first one and was almost as great a popular success. In 1844 he visited Paris and gave a series of orchestral concerts. From 1845 to 1847 he lived in Spain and wrote two overtures on Spanish national themes, *Jota Aragonesa* and *Noche en Madrid.* His other works include compositions for the pianoforte, on which instrument he was a brilliant performer, symphonies, orchestral suites, and numerous songs and romances, the latter clearly indicating the influence of Field. He died at Berlin, while on a visit to his old teacher, Dehn. Consult: Cui, *La musique en Russie* (Paris, 1880); N. Findeisen, *M. I. Glinka* (St. Petersburg, 1898, in Russian); A. Pongin, *Essai historique sur la musique en Russie* (Paris, 1904).

GLINKA, Sergeevitch Nikolai (1775–1847). A Russian author, brother of Feodor Glinka. He was born in the Government of Smolensk and lived principally at Moscow, where he devoted himself to literary work and founded the anti-French periodical *Russky Vestnik* (the Russian Courier). His contributions to juvenile literature include *Russian History for Young People* (3d ed., 1824) and *Reading for Children* (1821). Glinka was a very prolific author; he is said to have written more than 50 works. During the last 20 years of his life he was a censor at Moscow. Owing chiefly to his exaggerated chauvinism, Glinka is now entirely neglected. His *Notes on 1812*, however, still retains some historical interest.

GLIO′MA, glī-ō′mȧ (Neo-Lat., from Gk. *γλία*, *glia*, glue). A tumor arising from the delicate connective tissue which holds together the nerve substance, either of the brain or of other parts, and which has a gummy or glutinous consistency. Its usual seat is the brain, spinal cord, or orbit. See Tumor.

GLIS′AN, Rodney (1827–1890). An American physician. He was born at Linganore, Md., and graduated at the University of Maryland in 1849. After practicing a few months in Baltimore, he was appointed an assistant surgeon in the United States army and served in that capacity from 1850 to 1861. In the latter year he entered practice in San Francisco and ultimately settled at Portland, Oreg. His publications include the following: *Journal of Army Life* (1874); *Text-Book of Modern Midwifery* (1881); *Two Years in Europe* (1887).

GLISSON, glĭs′ŏn, Francis (1597–1677). An English physiologist, born at Rampisham, Dorsetshire, and educated at Cambridge and Oxford. He became professor of physics at the former university in 1636 and retained that position until his death. In 1639 he also received an appointment as lecturer on anatomy at the College of Physicians, London, of which he was president from 1667 to 1669. He was one of the founders of the Royal Society. His investigations on the morbid anatomy of rickets, as treated in his famous work entitled *De Rachitide, sive morbo puerili qui vulgo The*

Rickets dicitur, Tractatus (1650), is especially notable. His work on the liver and its diseases, entitled *Anatomia Hepatis* (1654), is also important, the term "Glisson's capsule," now a part of medical phraseology, perpetuating the name of its author.

GLIS'SON, Oliver S. (1809–90). An American naval officer, born in Ohio. He entered the navy as a midshipman in 1826, commanded the schooner *Reefer* during the Mexican War, and accompanied Commodore Perry to Japan in 1853–55. In the Civil War he commanded successively the *Mount Vernon* and the *Mohican*, and in the attacks of December, 1864, and January, 1865, on Fort Fisher (q.v.), commanded the third division of the fleet. He was promoted commodore in July, 1866, and rear admiral in June, 1870, and on Jan. 18, 1871, was retired from the service.

GLOAG, glōg, Paton James (1823–1906). A Scottish clergyman. He was born at Perth and was educated at the academy in that city and at the universities of Edinburgh and St. Andrews. In 1848 he was appointed minister at Dunning and remained there until 1860, when he accepted a call to the ministry of Blantyre. He was minister of Galashiels from 1871 to 1892, when he removed to Edinburgh. He was moderator of the General Assembly in 1889. Besides several translations from the German of works on the New Testament by Lechler, Huther, Lünemann, and Meyer, he published the following works: *Assurance of Salvation* (1853; 2d ed., 1869); *Exegetical Studies* (1884); *Introduction to the Johannine Writings* (1891); *Subjects and Modes of Baptism* (1891); *The Life of Saint John* (1892). Consult the biography by his wife (London, 1908).

GLOBE. A city and the county seat of Gila Co., Ariz., 82 miles (direct) north of Tucson, on the Arizona Eastern Railroad (Map: Arizona, E 4). Noteworthy features are the Roosevelt Reservoir, costing more than $8,000,000, and the Old Dominion Library. The mining and smelting of copper is the chief industry, and there are also silver and gold mines. Globe owns its water-works system. It was first settled in 1873. Pop., 1900, 1495; 1910, 7083.

GLOBE (from Lat. *globus*, ball). A term used to denote any round or spherical body (see Sphere) and often used to signify the earth. "Globes," or "the globes," generally means a pair of artificial globes used as a part of schoolroom apparatus. These are usually hollow spheres of cardboard, coated with a composition of whiting, glue, and oil, upon which paper bearing certain delineations is laid. Globes are either celestial or terrestrial. On the *celestial* globe the stars are represented in positions corresponding to their actual situation in the sky. If the celestial globe is *oriented* (i.e., set in position) correctly, a line drawn from its centre to any star marked on its surface will, if produced to the sky, pass through the actual star. On the *terrestrial* globe the distribution of land and water and their subdivisions, together with important places, are laid down in positions corresponding to those which they actually occupy on the surface of the earth. Terrestrial globes came into wide use as soon as the idea of the sphericity of the earth became prevalent. They afford a generalized representation of the earth which is very convenient, although the equatorial diameter exceeds the polar by $\frac{1}{299}$ of its length and the difference is not appreciable to the eye in the sizes of globes usually constructed. The usual mode of making globes is as follows: A ball of wood or iron is used as a matrix, and a layer of damped paper is carefully and closely placed upon this, without paste, and other layers are successively pasted over the first one. Ordinary cardboard is thus produced, but instead of being flat, as usual, it forms a spherical shell. When sufficiently thick, this is cut into two hemispheres, the section being made in the line of the intended equator. The hemispheres are then taken off the matrix and again glued together on an axis, and the whiting composition laid on, the outside of which is smoothed and finished to shape in a lathe. The workman has to lay on this composition evenly enough to balance the globe, in order that it may rest at whatever point it is turned. The smooth surface is now marked with the lines of latitude and longitude and is covered with the paper on which the required geographical or astronomical delineations are engraved. In order to adapt the plane surface of the paper to the curvature of the sphere, it is printed in pieces, small circles for the Arctic and Antarctic regions, and the rest in lens-shaped gores, usually six in number. Great care is required in laying on these curved pieces, so that their edges shall meet exactly without overlapping. The surface is then colored and strongly varnished, and the globe mounted in its frame and stand. It was formerly impossible to represent the relief of the earth on globes, because elevations on the surface of the earth are insignificant when compared to the terrestrial diameter. In recent years, however, patches of color, technically known as layers, and contour lines have been adopted to show altitudes.

Globes of India rubber and gutta-percha have also been made, others of thin paper, to be inflated and suspended in a schoolroom. Embossed globes show, in exaggerated relief, the elevations and depressions of the earth's surface. Compound globes, including the celestial and terrestrial, have been made with an outer glass sphere for the celestial, and an orrery (q.v.) mechanism to show the varying relative positions of the sun and moon, etc. As schoolroom apparatus, globes are used for illustrating the form and motion of the earth, the position and apparent motion of the fixed stars, and for the mechanical solution of a number of problems in geography and practical astronomy. For this purpose each globe is suspended in a brass ring of somewhat greater diameter, by means of two pins exactly opposite to each other, these pins forming the extremities of the axis round which it revolves, or the north and south poles. This brass circle is then let into a horizontal ring of wood, supported on a stand. The globes in common use in schools are from 1 to 4 feet in diameter. The oldest terrestrial globe of any importance (though probably not the first) is that of Behaim. It was constructed in Nuremberg and bears the date of 1492. One of the earliest globes constructed after the discovery of America is that in the New York Public Library (1506–07). Consult V. Fiorini's "Le sfere cosmografiche e specialmente le sfere terrestri," in *Bollettino della Società Geografica Italiana*, vols. xxx–xxxi (Rome, 1893–94).

GLOBE, The. A famous Elizabethan theatre, where most of the plays of Shakespeare, Jonson, Beaumont, Fletcher, Chapman, Massinger, and Ford were first produced. It was erected in Bankside, by the Burbage brothers, in 1599, and was built chiefly from the material of their earlier theatre in Shoreditch. Its hexagonal outer wall inclosed a circular pit, flanked by three galleries, the pit being open to the sky, while the galleries were roofed with thatch, which caught fire in 1613, during a representation of *Henry VIII*, and caused the destruction of the building. It was soon rebuilt, but was destroyed in 1644 by the Puritans, and a brewery now occupies its site. Consult C. W. Wallace, *Three London Theatres of Shakespeare's Time* (Lincoln, Neb., 1909).

GLOBE AMARANTH. See Amaranth.

GLOBE′FISH. A marine fish of the family Tetraodontidæ and order Plectognathi (q.v.), remarkable for its power of inflation. These fishes possess a large, ventral, bladder-like expansion of the œsophagus, which may be filled with water or air so suddenly that the body assumes at once a spherical form. The skin is stretched to its utmost extent and becomes firm. The scales are mostly reduced to spines embedded in the skin, and these spines now stand upright and form an important protective covering. This power of swelling suddenly must be regarded as an adaptation for defense, since the distended fish can hardly be grasped with impunity by the mouth of any predacious animal. The fishes of this group are chiefly tropical, and some species are as large as a football, or larger, and used as food. Two or three species occur along the eastern coast of the United States, of which one (*Spheroides turgidus*) is very abundant, especially along the rocky shores of southern New England and Long Island, where it is known as swelldoodle, puffer, egg fish, and bellows fish. It is often caught with a hook, and hundreds, usually small, are taken with every haul of a seine. When lifted from the water, it immediately inflates its body by means of short, jerking inspirations of air, and if dropped on the ground will bound about like a rubber ball; or if thrown in the water will bob about for some time at the surface, with little control over its movements and relieving itself with difficulty of its inflation. It forms a very amusing tenant of a salt-water aquarium. A well-known globefish of the Nile is the fahaka (*Tetrodon fahaka*). A large edible West Indian species (*Lagocephalus lævigatus*) is better known as rabbit fish. See Plate of Plectognath Fishes.

GLOBEFLOWER (*Trollius*). A genus of plants of the family Ranunculaceæ, with a calyx of yellow sepals and a corolla of small and linear petals. There are several species, natives of the colder parts of the Northern Hemisphere. The common globeflower, the lucken gowan of the Scotch (*Trollius europæus*), a native of Great Britain, is sometimes cultivated in flower gardens. The globelike appearance of the flower suggests the name. The spreading globeflower, *Trollius laxus*, occurs in deep swamps from Connecticut to Michigan and also in the Rocky Mountains.

GLOBIGERINA, glō-bĭj′ẽr-ī′nȧ (Neo-Lat., from Lat. *globus*, ball + *gerere*, to carry). A genus of multilocular perforate foraminifera, with minute shells of glassy, calcareous texture and globular form. They are exceedingly abundant in many portions of the ocean bottom, where they form the greater proportion of the "globigerina ooze." Specimens referred to the genus *Globigerina* have been found in the Lower Cambrian rocks of the Province of New Brunswick, Canada. Their next appearance is in Triassic rocks. But they do not attain prominence till Tertiary time, when they became quite as abundant as they are at present. See Foraminifera; Ooze; Ocean Deposits.

GLO′BIN. See Globulins.

GLO′BOID (from Lat. *globus*, ball + Gk. *εἶδος*, *eidos*, form). A spheroidal mass of a double phosphate of calcium and magnesium found in aleurone grains. It is supposed to be a by-product of the formation of the crystalloid in those bodies. See Aleurone.

GLOB′ULINS (from *globule*, from Lat. *globulus*, dim. of *globus*, ball). Natural proteins, which with albumins constitute the principal nitrogenous component of animal and plant tissues. Globulins of different origin possess some individual differences in physical and chemical properties, but also some points of similarity which permit the grouping of them into one class. The principal points of similarity are the following: they all possess the properties of very weak acids; as such, in a free state, they are insoluble in water. They enter into loose combination with neutral salts, and in that form they are soluble in water. However, the addition to a solution of globulin of an excess of the salt again causes its precipitation. Heating of an aqueous solution of every animal globulin, and some vegetable globulins, causes their coagulation. Globulins differ from albumins, not only by differences in solubility and in precipitability, but also by their chemical composition. On decomposition of globulins among other amino acids was found glycocoll. This amino acid is not obtained on decomposition of albumins.

Preparation of Globulins. They are prepared from natural sources by extraction with salt solutions. As a rule, the solution contains also albumins and other proteins. The globulins are obtained from this solution in solid state by means of precipitating agents. These may be either very weak acids or neutral salts. They may also be precipitated by dialysing the solution and completely removing the neutral salts. A process analogous to this consists in diluting a salt solution of globulin with a large volume of water. Some of the principal animal globulins are:

1. *Serum globulin*, which occurs in the blood plasma, serum, lymph, transudates, and exudates, and in the white and red cells.

2. *Fibrinogen* is also found in the blood plasma and plays an important part in the clotting of blood. In this process it is converted by the action of fibrin ferment or thrombin into fibrin.

3. *Myosin* constitutes the principal mass of the soluble proteins of the dead muscle. In the live muscle it is present as myosinogen, which is converted by the action of a specific enzyme, the myosin ferment, into myosin.

4. *Crystallin* is the globulin which is found in the lens of the eye.

5. *Lactoglobulin*, together with casein and lactalbumin, occurs in milk plasma.

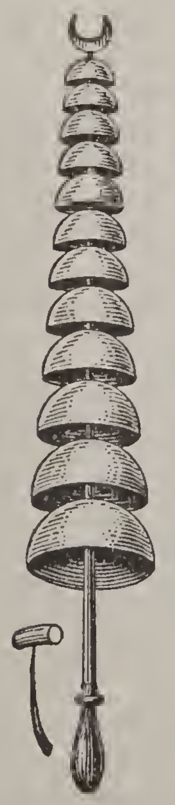
The vegetable globulins differ from those of animal origin by their solubilities and by their behavior towards neutral salts. For instance, magnesium sulphate is a general precipitant for animal, but not for plant, globulins. Half saturation with ammonium sulphate precipitates nearly all animal, but does not precipitate a large number of vegetable, globulins. Further, vegetable globulins differ from animal in the behavior of their aqueous solutions towards heat; whereas the former are only imperfectly coagulated by heat, the latter coagulate completely. A particularly interesting property of the vegetable globulin is its capacity to form crystalline compounds. Finally animal and vegetable globulins differ in the proportion of their individual components. When decomposed by heating with strong mineral acids, the vegetable globulins yield a higher proportion of aspartic and particularly of glutaminic acids.

The following are the principal vegetable globulins:

GLOBULINS:	OBTAINED FROM SEEDS OF:
Legumin..........	Pea, *Pisum sativum.* Horse bean, *Vicia faba.* Vetch, *Vicia sativa.* Lentil, *Ervum lens.*
Vignin...........	Cow pea, *Vigna sinensis.*
Glycinin..........	Soy bean, *Glycine hispida.*
Phaseolin, crystalline............	Kidney bean, *Phaseolus vulgaris.* Adzuki bean, *Phaseolus radiatus.* Lima bean, *Phaseolus lunatus.*
Conglutin........	Lupines, *Lupinus.*
Vicilin...........	Horse bean, *Vicia faba.* Pea, *Pisum sativum.* Lentil, *Ervum lens.*
Corylin..........	Hazelnut, *Corylus avellena.*
Amandin.	Almond, *Prunus amygdalus.* Peach, *Prunus persica.* Plum, *Prunus domestica.* Apricot, *Prunus armeniaca.*
Juglansin.........	European walnut, *Juglans regia.* American black walnut, *Juglans nigra.* American butternut, *Juglans cinerea.*
Excelsin, crystalline	Brazil nut, *Bertholletia excelsa.*
Edestin..........	Hempseed, *Cannabis sativa.*
Avenalin.........	Oat, *Avena sativa.*
Castanin.........	European chestnut, *Castanea vulgaris.*
Maysin...........	Maize, *Zea mays.*
Tuberin, found in the tubers of....	Potato, *Solanum tuberosum.*

GLO′BUS HYSTER′ICUS (Lat., hysterical ball), or BALL IN THE THROAT. See HYSTERIA.

GLOCKENSPIEL, glŏk′en-spēl (Ger., bell play). A musical instrument originally consisting of bells fastened to an iron rod and rising above one another in the form of a pyramid. The bells were struck by means of a hammer with a metal head. Later the glockenspiel was constructed in the shape of a lyre, within which metal bars, instead of bells, were fastened. The bars yield a fuller tone than the bells. The instrument is now also constructed so that metal bars are arranged within a box. In this form the glockenspiel is used in the modern opera orchestra and has a range from b¹ to d³. The music is written an octave lower than it sounds. Wagner employs the glockenspiel in the magic fire scene in *Die Walküre.*



EARLY FORM OF GLOCKENSPIEL.

GLOCKNER, glŏk′nẽr, or **GROSSGLOCKNER,** grōs-glŏk′nẽr. One of the highest peaks of the Austrian Alps, commanding a famous view, situated on the boundary between Tirol, Carinthia, and Upper Austria (Map: Austria, C 3). Its altitude is 12,344 feet.

GLOGAU, glō′gou, or **GROSSGLOGAU.** The capital of a district and a second-class fortress in the Prussian Province of Silesia, situated on the left bank of the Oder, 60 miles northwest of Breslau (Map: Germany, F 3). The town is fortified on three sides and connected by a wooden bridge with a fortified island in the Oder. The more prominent buildings of Glogau are the old castle, the Gothic cathedral on an island in the Oder, the Rathaus, with a high tower, and the post office. Glogau has a prominent geographical institute, a municipal theatre, two Gymnasia, a war college, and is an infantry, artillery, and cavalry station. Castings, machinery, boilers, sugar, starch, dextrin, furniture, and hats are manufactured. It is an important wool market. The railway shops are extensive, and there is some trade in wine. Pop., 1900, 22,147; 1910, 24,524. Glogau was an important fortified place as early as the beginning of the eleventh century and became in the thirteenth century the capital of the Principality of Glogau. At the end of the fifteenth century the town, together with the principality, fell into the hands of Bohemia. During the Thirty Years' War, Glogau was captured repeatedly by the Swedes and the Imperial troops, and in 1741 it was taken by storm by the Prussians and strongly fortified.

GLOGAU, GUSTAV (1844–95). A German philosopher, born at Laukischken, East Prussia, and educated at Berlin. In 1882 he was appointed professor at the Polytechnical Institute at Zürich, in 1883 professor extraordinary at Halle, and in 1884 professor of philosophy at Kiel. In 1895 he entered upon a tour through Greece, where he met his death in an accident. Glogau regards philosophy as a science embodying the results of all achievements and thus represents it as a natural growth, inseparable from evolution in its widest sense. Besides his principal work, *Abriss der philosophischen Grundwissenschaften* (1880–88), he published: *Ziel und Wesen der humanistischen Bildung* (1881); *Grundriss der Psychologie* (1884); *Die Ideale der Socialdemokratie und die Aufgabe des Zeitalters* (1892); *Die Hauptlehren der Logik und Wissenschaftslehre* (1894); and *Das Vorstadium und die Anfänge der Philosophie,* ed. by Siebeck (1896).

GLOGGNITZ, glŏg′nĭts. A small market town of Lower Austria, situated on the Schwarza, at the northern base of the Semmering Alps, 45 miles south-southwest of Vienna (Map: Austria, D 3). The building of the railway from here to Mürzzuschlag, a distance of 35 miles, was an extraordinary feat of mountain engineering. The line was constructed in 1848–54 at a cost of about $10,000,000. Gloggnitz has a picturesque castle situated on a hill. Until 1803 it was a Benedictine abbey, but afterward became a private residence. To the southwest lies the interesting castle of Wartenstein. The town has cotton and woolen mills, cabinetworks, stone quarries, and magnesia factories. In the Schwarza valley near by is the large paper factory of Schlögmühl. Pop. (commune), 5296.

GLOMERULE, glŏm′ẽr-ūl (from Lat. *glomus,* ball of yarn). A flower cluster (inflorescence) which is merely a cyme (q.v.), in which the flowers are crowded so close together as to form a sort of head, as seen in some species of dogwood. See INFLORESCENCE.

GLOM′MEN. The largest river of Norway, issuing from Lake Aursundsjö, at the town of Röraas, at an altitude of about 2300 feet (Map: Norway, D 6). It flows in a general southerly direction past the fortress of Kongsvinger, emptying into the Skager Rack at Fredrikstad, after a course of 350 miles. Its most important affluent is the Vormen. The Glommen forms a number of lakes and several waterfalls, which greatly detract from its usefulness as a navigable waterway. Boats ascend to the last waterfall, about 10 miles from the mouth of the river, and above this fall the river is navigable for about 20 miles.

GLONOIN, glŏn′ō-ĭn. See NITROGLYCERIN.

GLO′RIA IN EXCEL′SIS (Lat., Glory be to God on high). The first words and the title of one of the oldest Christian doxologies, Eastern in origin and in use for more than 1500 years. In the English church and American churches it forms part of the communion office and is a substitute for the Gloria Patri after the Psalter. See DOXOLOGY.

GLO′RIA′NA. The "Faerie Queene" in Spenser's famous poem of that name, for whose honor the various combats against vice are undertaken, and who is Prince Arthur's fated bride. She shadows forth Queen Elizabeth in her capacity of sovereign.

GLO′RIA PA′TRI (Lat., Glory be to the Father). The minor doxology in the Christian Church. It is used after the selections from the Psalter and at the end of the anthems.

GLORIET′TA, BATTLE OF. One of the most important battles fought in the West during the American Civil War. The Union forces, composed of the First Colorado Volunteers and some New Mexico Regulars, under Colonel Slough, met the Confederates under Major Pyron at Apache Cañon, near Santa Fe, on March 22, 1862. The battle was indecisive, both sides withdrawing from the field. On March 28, however, the two forces met again at the same place. The Federal command, by previously destroying the ammunition, baggage, and provisions of the Confederates, completely routed them, and they were compelled to fall back on their base at Santa Fe. The North lost 71 killed and wounded and the South 96. In Southern reports this battle is called Glorietta, in Northern reports Apache Cañon. It practically put an end to the only serious attempt the Confederates made to invade the West. Consult *Battles and Leaders of the Civil War*, ed. by Johnson and Buel (New York, 1887–88).

GLORIOUS VIRGIN, or SAINT MARY THE GLORIOUS. An order of knighthood, founded early in the thirteenth century, and approved by Pope Urban IV in 1262. This institution was ecclesiastical as well as military, and its objects were the protection of widows and orphans and the furtherance of the peace of Italy by the suppression of the strife between Guelphs and Ghibellines. The badge was a red cross surmounted by two stars, and the costume a white mantle. The members were not obliged to take the vow of celibacy or live in monasteries; consequently they were called *Gaudenti* (or Joyful) and this is the name by which they are best known. The order was suppressed towards the end of the sixteenth century. The Order of St. Mary the Glorious, at Rome, was sanctioned by Paul V in 1618. Its object was to suppress the Barbary corsairs who infested the Mediterranean. To make the order effective, the Pope gave the knights command of his galleys and set apart the town and harbor of Civitavecchia for their use. Consult Ashmole, *History of the Most Noble Order of the Garter* (London, 1715).

GLORY, IN METEOROLOGY. See HALO.

GLOSS (from Lat. *glossa*, gloss, Gk. *γλῶσσα*, *glōssa*, tongue). A brief note or explanation written upon the margin or between the lines of a manuscript by some reader. In subsequent copyings such glosses often became incorporated as a part of the text. The object was generally to explain some verbal difficulty. From an early period these difficulties were the object of attention, and the writers who devoted themselves to their elucidation were called *glossatores*, and their works *glossaria*. The principal Greek glossatores are Hesychius of Alexandria (fourth century), Photius (q.v.), Zonaras (twelfth century), Suidas (q.v.), and Favorinus, a Benedictine (died 1537). Their works are lexicons of difficult words. Most of the rabbinical writers did the same work for the Hebrew text of the Old Testament. The chief glossatores of the Latin Vulgate are the celebrated Walafrid Strabo (q.v.), in the ninth century, author of the *Glossa Ordinaria*, and Anselm of Laon, author of the *Glossa Interlinearis*, who continued Walafrid's work in the twelfth century. Their work was the great storehouse of mediæval exegesis. It was printed with the Latin text in an edition of the Vulgate in 1480. In Roman and canon law the practice of introducing glosses was of early origin and probably was in imitation of the biblical glosses. Among jurists the gloss was not purely verbal, but had to do with the true interpretation of the law, and in some cases it was held to be of equal authority with the text itself. From the position which it occupied in the manuscript, being generally written between the lines of the text, it was called *glossa interlinearis*. The gloss of the Roman law is written in very pure Latin, that of the canon law in the Latinity of the mediæval schools. The first collection of glosses to the canon law was made by Johannes Semeca (Teutonicus) in 1212. It accompanied the *Decretum Gratiani* and was printed in connection with it (Lyons, 1584). Other divisions for the *Corpus Juris Canonici* also had glosses, and they are given in the edition mentioned above. The term is also used in textual criticism of the Bible for brief readings suspected to be added to the original text for explanatory purposes, written first on the margin and later incorporated into the text.

GLOSSARY. See DICTIONARY.

GLOSSI′TIS (Neo-Lat., from Gk. *γλῶσσα*, *glōssa*, tongue). A term used in designating inflammatory diseases of the tongue. *Glossitis superficialis simplex* occurs with great frequency in febrile and digestive disorders accompanied by "coated tongue" or "strawberry tongue." Chronic superficial glossitis occurs often in hypochondriacs, especially in women; the tongue burns, is painful, especially during eating or speaking, and is dotted with red spots and white nodules. It may last for years, with intermissions of weeks or months. Treatment with nitrate of silver or lactic acid is palliative. A similar condition (*Leucoplakia buccalis*), also known as psoriasis or ichthyosis of the tongue, or smoker's patches, may result from syphilis, the irritation of roughened teeth, excessive smoking, and indigestion. The disease tends to become malignant. Hairy tongue is a rare glossitis in which, surrounding a smooth, yellow, brown, or black area, the papillæ are smaller and resemble bristles. The treatment consists in scraping and the application of antiseptics.

In "geographical tongue" bright red plaques appear, slightly elevated and circumscribed by a gray marginal zone. The forms of the maps change frequently. The trouble generally disappears without treatment. Acute papular glossitis is extremely rare. In acute diffuse glossitis, or abscess of the tongue, the latter becomes enormously swollen, and the chief dangers of the attack are suffocation from swelling of the parts about the hyoid bone, closure thereby of the glottis (see LARYNX), and general infection. The only effective treatment is to make deep incisions into the inflamed part. With a straight bistoury several incisions are made lengthwise sufficiently deep to evacuate the pus. A good deal of blood will usually follow, but if care has been taken not to injure the lingual artery or its branches (see TONGUE), there is no real danger from this cause. Glossitis is also caused by mercury during mercurial stomatitis, by syphilis, tuberculosis, and actinomycosis.

GLOS'SOP. A market town and municipal borough in Derbyshire, England, 13 miles east-southeast of Manchester (Map: England, E 3). The town consists of Old Town (Glossop proper), Howard Town (Glossop Dale), and Mill Town. It is situated on rising ground above the deep Dinting valley, where a 2000-foot railway bridge spans it. It is the chief seat of the cotton manufacture of Derbyshire, and has woolen, cotton, and paper mills, dye works, print fields, and iron foundries. The parish church of All Saints, Victoria Hall with a public library, the grammar school, mechanics' institute, and the town hall and market house are the principal buildings. The town maintains a public park, a hospital, and public baths. Melandra Castle, the site of a Roman camp, is near. Pop. (borough), 1901, 21,526; 1911, 21,688.

GLOSSOP'TERIS (Neo-Lat., from Gk. *γλῶσσα*, *glōssa*, tongue + *πτερίς*, *pteris*, fern). A fossil fern of the family Tæniopteridæ, which is an important index fossil of certain Permian-Triassic beds of India, Australia, South Africa, and South America, known as the Gondwana series. This fern has thick leaves of linguate form, with entire margin, median rib, and anastomosing veins.

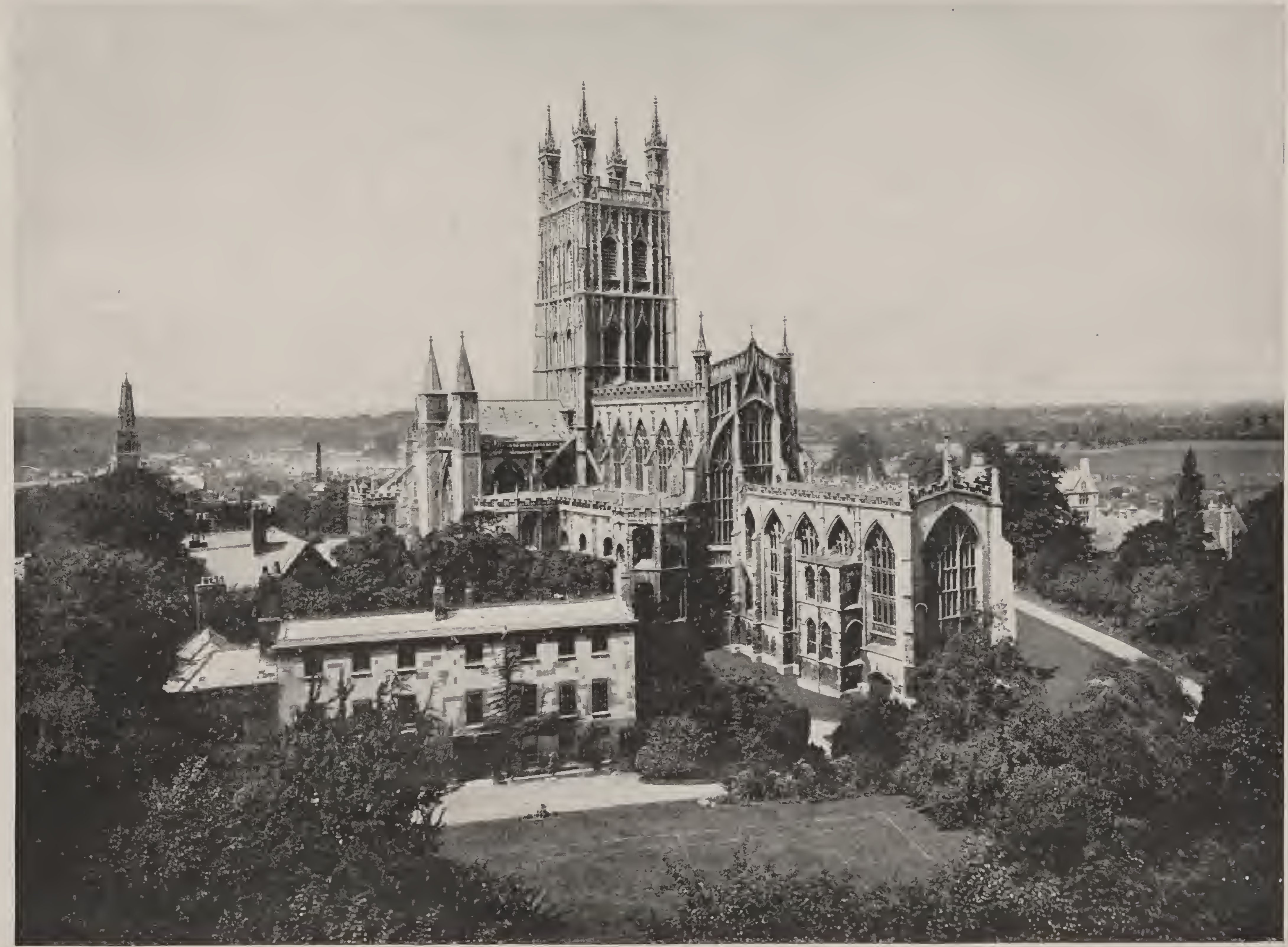
GLOS'TER, or **GLOUCESTER,** glŏs'tẽr, EARL OF. The father of Edgar and of the bastard Edmund, in Shakespeare's *King Lear*. He is deceived and betrayed by his illegitimate son, blinded by Cornwall, and guided through the country and saved from springing over Dover Cliff by the heir, whom he had unjustly disowned. The story is taken from Sidney's *Arcadia*.

GLOT'TIS. See LARYNX.

GLOUCESTER, glŏs'tẽr (AS. *Glēowceaster*, fair city, Lat. *Glevum, Claudia*). An inland port, city, and county borough, the county town of Gloucestershire, England, on the left bank of the Severn, 33 miles northeast of Bristol (Map: England, D 5). The city is built on a slight declivity, sloping to the Severn, and is sheltered by the surrounding Cotswolds and Malvern Hills. The modern portion is in the neighborhood of the public park and spa, which contains the chalybeate spring, discovered in 1814. The four main streets, named after their orientation, are wide, and built on the ancient Roman ground plan, meeting at right angles in the centre of the town, where the former town hall, the historic Tolsey, stands at the intersection, on the site of the old Roman Capitol. Other buildings and objects of interest are the picturesque deanery, formerly the old priory lodge; the New Inn, a pilgrim's hostelry, built in 1540; the episcopal palace; the new guildhall; and many quaintly gabled timbered houses. A cross marks the spot where Bishop Hooper was burned. The principal building in Gloucester is the cathedral, the foundation of which dates from the eleventh century. Formerly a Benedictine abbey, skillful alterations and additions evolved from the Norman body a fine building in various styles of Gothic, which in 1541, after the suppression of monasteries, was converted into a cathedral by Henry VIII. The chief external ornament is the stately central tower, 225 feet high, with its beautiful tracery and pinnacles. It contains the "Great Peter" bell, weighing over three tons. The cathedral was restored between 1873 and 1890 and in 1897. Gloucester has three endowed ancient schools, in addition to several modern schools. It has an important municipal record; it received special charters from several monarchs, and in 1483 was incorporated by Richard III, who made it a county in itself. It is governed by a mayor, 10 aldermen, and 30 councilors. It owns its markets, water works, cemetery, public baths, technical schools, public library, electric-lighting supply, and dust-destructor works. It has manufactures of railway cars, engines, agricultural implements, and cutlery. There are boat and ship building yards, foundries, flour and saw mills, and chemical, rope, match, marble, and slate works. Bell founding and cloth and pin manufactures were once important industries which no longer exist. A ship canal, 17 miles long, communicating with the estuary of the Severn below Sharpness Point, gives access to the spacious docks. The famous bore or tidal wave of the Severn attains its greatest height just before reaching Gloucester. Considerable commerce is carried on with the Baltic and other foreign ports; corn, timber, wines, and spirits are imported; iron and coal, bricks, pottery, salt, malt, and agricultural products are exported. Gloucester is the seat of an American consul. Pop., 1891, 41,303; 1901, 47,955; 1911, 50,035; area, 2318 acres.

Gloucester was an important Saxon town, styled by Bede "one of the noblest cities in the land." It suffered greatly during the period of the Danish incursions. It was a favorite residence of the Norman kings and was the seat of eight parliaments. Gloucester afforded a refuge and support to Queen Matilda in her contest with Stephen, and Henry III, who "loved Gloucester better than London," was crowned in the abbey. In 1643 Gloucester successfully resisted the royal army under Charles I until relieved by Essex, and at the Restoration its fortifications were dismantled for this "malignity." Robert of Gloucester, the metrical historian, Whitefield, and Wheatstone are among Gloucester's celebrities. Consult: Fosbroke, *Original History of the City of Gloucester* (London, 1819); Masse, *The Cathedral Church of Gloucester* (ib., 1898); *Victoria History of the Counties of England*, vol. ii (ib., 1907).

GLOUCESTER. A city in Essex Co., Mass., including the villages of Annisquam, Bay View, East Gloucester, Freshwater Cove, Lanesville, Magnolia, Riverdale, and West Gloucester, 32 miles northeast of Boston, on Massachusetts Bay, on Cape Ann, and on the Boston and Maine Railroad (Map: Massachusetts. F 2). It is a



GLOUCESTER CATHEDRAL

popular resort for summer residents, artists, and tourists, and has the Gilbert Hospital, Home for Aged Fishermen, Huntress Home, Magnolia, public, and Sawyer free libraries, and Stage Fort, Marine, and other parks. The city is the seat of the largest fishery interests in the United States, over 5000 men being engaged in the cod and mackerel fisheries. There is a large, accessible, and safe harbor, and salt, coal, and lumber are extensively imported. Besides the fisheries and the quarrying of granite, the principal industries are shipbuilding, drop forging, brass founding, and the manufacture of fish glue, anchors, machinery, oil clothing, dresses, hardware, hosiery, shoes, nets and twine, sails, and cigars. In 1623 a company from Dorchester, England, settled at Gloucester, but three years later a portion of the settlers removed to Naumkeag (Salem). The permanent settlement dates from about 1633, and a town charter was granted in 1642. It was not until the beginning of the eighteenth century that Gloucester became especially prominent for its fisheries and its shipbuilding industries. Many privateers were sent out during the Revolution and the War of 1812, and the town was unsuccessfully attacked by the English in 1775. Near by is the large sunken rock called Norman's Woe, rendered famous by Longfellow's "The Wreck of the Hesperus." Gloucester was incorporated as a city in 1873 and adopted the commission form of government in 1908. The city owns and operates its water works. Pop., 1900, 26,121; 1910, 24,398. Consult J. J. Babson, *History of Gloucester* (Gloucester, 1860, supp. 1876), and J. R. Pringle, *History of the Town and City of Gloucester, 1623–1902* (ib., n. d.).

GLOUCESTER, Dukes and Earls of.—Robert, first Earl of Gloucester (?–1147), was a natural son of King Henry I and the husband of Mabel of Gloucester. As the champion of the cause of his sister Matilda, he won the famous battle of Lincoln (1141) over Stephen of Blois.—Richard de Clare (1222–62), seventh Earl, was active on the side of the barons under Henry III, quarreled with Simon de Montfort in 1239, but had made up with him in 1261.—Gilbert, eighth Earl, surnamed the "Red" (1243–95), was one of the principal leaders of the barons in their conflict with Henry III, but afterward joined the royal cause, and was Regent during the absence of Edward I.—Gilbert, ninth Earl (?–1314), a son of the preceding and of the daughter of Edward I, was leader of the advance guard at the battle of Bannockburn, in which he fell. The line soon afterward became extinct, but was renewed in Thomas of Woodstock, Earl of Buckingham (1355–97), the youngest son of Edward III, who was made Duke of Gloucester by his uncle, Richard II, in 1385, and who later acquired an extraordinary political influence and dominated the affairs of England.—Among the later conspicuous representatives of the title were Humphrey, Duke of Gloucester, the youngest son of Henry IV (1391–1447), who was Protector during the minority of Henry VI; Richard, brother of King Edward IV, and King of England as Richard III; William Henry (1734–1805), a brother of George III; and William Frederick (1776–1854), a son of the preceding. Consult Vickers, *Humphrey, Duke of Gloucester* (London, 1907).

GLOUCESTER CITY. A city in Camden Co., N. J., 1 mile south of Camden, on the Delaware River, opposite Philadelphia, with which it is connected by ferry, and on the Atlantic City and the Pennsylvania railroads (Map: New Jersey, B 4). It has manufactures of incandescent gas burners, Smyrna rugs, woolen yarns, boats, drills, paper, etc. Settled in 1677, Gloucester City was incorporated in 1868 and is governed under the charter of that date, which provides for a mayor, elected every two years, and a unicameral council. The city owns and operates its water works. Pop., 1900, 6840; 1910, 9462; 1914 (U. S. est.), 10,577.

GLOUCESTERSHIRE, glŏs′tẽr-shẽr. A southwest county of England, bounded by Worcester and Warwickshire on the north, Oxford on the east, Wiltshire and Somerset on the south, and Monmouth and Hereford on the west (Map: England, D 5). Area, 1259 square miles. Gloucestershire is famous as a dairy county and raises large numbers of cattle; its cider is also noted. The Forest of Dean has some iron deposits. The manufactures are numerous, cloth and textiles being important. The county contains the parliamentary boroughs of Cheltenham and Gloucester and part of the parliamentary borough of Bristol. Capital, Gloucester. Pop., 1901, 708,439; 1911, 736,125. Consult *Victoria History of the Counties of England*, vol. ii (London, 1907), and P. H. Ditchfield, *Memorials of Old Gloucestershire* (ib.; 1911).

GLOUSTER, glŏs′tẽr. A village in Athens Co., Ohio, 15 miles north of Athens, on the Kanawha and Michigan, the Toledo and Ohio Central, and the Zanesville and Western railroads (Map: Ohio, G 6). The chief industries are coal mining and brickmaking. The water works and electric-light plant are owned by the village. Pop., 1900, 2155; 1910, 2527.

GLOUVET, glo͞o′vâ′, Jules de. See Quesnay de Beaurepaire, Jules.

GLOVAT′SKI, Alexander. See Glowacki, Aleksander.

GLOVE (AS. *glōf;* perhaps connected with Goth. *lōfa*, Icel. *lōfi*, Eng. *loof*, palm of the hand). A covering for the hand having a separate sheath for each finger, as distinguished from a mitten, in which there is a separate compartment for the thumb only. The glove is a very ancient article of dress. It has been found in the relics of the cave dwellers, made of leather and sewn with leather thread. Gloves were worn by the ancient Greeks, but chiefly as a protection for the hands in doing heavy work, rather than as an ornamental part of the dress. By the Romans they were worn as ornaments and were considered a sign of rank. While something in the form of a protection for the hands from cold must always have been needed by northern nations, gloves did not become an important article of dress until after the Norman Conquest. It is thought that the custom of carrying a pet falcon upon the wrist led to their general use. During the eighth and ninth centuries they were worn chiefly by persons of noble birth. Hence they were considered a sign of rank and were taken off, as a token of respect, before a superior or in churches. They were worn in the hat as favors and cast down as a challenge. By the sixteenth century gloves were worn by all classes, and then, as now, were made of silk, worsted, and leather. Those worn by the wealthy were most elaborately ornamented with embroidery and lace. As early as 1190 a guild of glove makers was formed in France, which took upon itself the task of maintaining honest workmanship among glove makers and in introducing constant improvements in methods of manufacture. In Scotland the glovers of Perth were incorporated in 1165. Nearly five centuries later a company of glovers was organized in London, and that city has been an important centre of glove manufacture ever since. At one time glove making was an important industry in Ireland, and the famous "Limerick" glove was widely esteemed for its exquisite texture and workmanship. For many centuries France has excelled in the number and quality of gloves manufactured in some of her cities.

Glove Manufacturing in the United States. The manufacture of leather gloves in the United States is said to date back to the days of Sir William Johnson in New York State. In 1760 he induced several families of glove makers from Scotland to settle on his grants, who brought over with them their glove patterns, and the necessary needles and thread for glove making. Gloves continued to be made in this locality, and gradually the demand for them spread until by 1825 they had found a market in Albany and Boston. These early gloves, as compared with modern productions, were crude and clumsy. They were cut with shears from pasteboard patterns, the cutting being usually done by men and the sewing by women. Later, dies were introduced for cutting and were a great improvement. The invention of the sewing machine in 1852 marked the beginning of a new era in glove manufacture, and soon all hand work was superseded. Steam power for running the sewing machines was introduced in 1875. From the start glove making has been to a large extent a household industry, and it still gives employment to a large number of home workers. The cutting and the stitching on the backs are done at the factories before the gloves are sent out.

Glove-Making Processes. The term "kid" is a mere technicality, as the quantity of leather bearing this name yearly consumed is largely in excess of what could be supplied from the skins of all the young goats that are annually slaughtered. Gloves are largely made from lambskin. The finest gloves, however, are made from real kid, derived chiefly from Germany, Austria, Sweden, Brazil, Madagascar, France, and Bavaria. The younger the kid, the thinner, finer, and softer the glove. Lambskin is tougher and harder to work than kidskin, but it is said that none but an expert can tell the difference in their appearance. The so-called dogskin, buckskin, and doeskin gloves are made chiefly from sheepskin; some of the thickest kinds of leather gloves are made from calfskin. *Suède* gloves are those in which the inside of the skin is used as the outside of the glove, the name being derived from the Swedish manner of making up gloves. *Glacé* gloves are made with the outside of the leather retained as the outside of the glove.

The leather in all cases undergoes a much lighter dressing than when used for boots and shoes. The skin having been freed from hair and cleaned, it is prepared for use by one of the three processes of dressing—tanning, tawing, or shamoying—described under LEATHER. For light dress gloves the skins are usually tawed. The leather is next broken or "staked" to render it pliable and even in texture. It is then colored, by painting lightly on the outside, two or three coats, with a brush, so that the inside will not be affected by the coloring. White gloves are simply undyed gloves. When the dye is thoroughly dried, the superfluous color is removed and the surface rubbed with a size. The gloves are now "doled" on a marble slab, to remove the dirt and irregularities. After the leather has been properly prepared the gloves are cut out by means of dies. The die cuts out all the parts, including the gussets. A single glove consists of from 16 to 19 pieces. The large skins are used for ladies' evening gloves, but one pair of which can be made from a single skin, though ordinarily two pairs of ordinary gloves can be made from one skin. The scraps that are left, unless the skin was tanned, are used for glue. The first and fourth fingers are completed by gussets or strips sewed only on the inner side, but the second and third fingers require gussets on both sides to complete the finger. Besides these, small pieces of a diamond shape are sewed in at the base of the fingers, toward the palm of the hand. The stitching of the parts together, and also the ornamental stitching on the back of the hand, as required by fashion, is done by specially made sewing machines. The putting on of the thumb piece requires special skill and management, and badly made gloves commonly give way at this point.

In the American glove factories there are two classes of cutters, the block and the table cutters, the former of whom are engaged chiefly on the cheaper grades of gloves. The block cutter simply cuts out the glove with a die and hammer, from a skin which is laid on a block of wood. The table cutter first dampens his skin, stretches it to the fullest possible extent, and cuts off the length of a glove. He then stretches it again and cuts it to width, after which fingers are cut to shape with a die. A table-cut glove is more elastic and hence fits better than one cut on the block. The table cutters employed in America are mostly foreigners from the glove-manufacturing centres of Europe, and many of them come from families which for centuries have been engaged in the glove-making industry. To be a good cutter requires not only great experience, but natural dexterity and rare judgment in selecting leather so as to cut out the greatest possible number of gloves and yet avoid flaws.

Gloves not Made from Leather. The manufacture of woven and knit gloves is an entirely separate branch of the trade. Sometimes the material is first woven and then cut and made up similarly to the leather gloves, or they may be knit into shape by special knitting machines.

Statistics. The centre of the glove industry in the United States is still in Fulton Co., N. Y., in the vicinity where Sir William Johnson planted his first colony of glove makers. Of the 377 glove factories in the United States, in 1909, as reported in the *Thirteenth Census, Manufactures* (1913), 225 were in the State of New York, 156 being in Fulton County, which supplied 54.7 per cent of the total product. Its two principal cities, Gloversville and Johnstown, reported 87 and 54 establishments respectively. The remaining establishments are scattered over the entire country. These 377 establishments represented a combined capital of $16,908,671, and they turn out an annual product valued at $23,630,398. This business has shown a steady growth since 1850, when the first census report of the industry was published. At that time there were already 110 glove factories in the country, with a capital of $181,200 and an annual product of $708,184. Of the 3,368,655 dozen pairs manufactured in 1909, all but 782,678 dozen pairs were men's gloves, as the finer grades of women's gloves are still chiefly produced in Europe. In 1913 the imports of gloves into the United States were valued at $7,691,927.

Consult: Beck, *Gloves: Their Annals and Associations* (London, 1883); Frothingham, *History of Fulton County, N. Y.* (Syracuse, 1892); Côte, *L'Industrie gantière à Grenoble* (Paris, 1903); Pflüger, *Die Lederhandschuindustrie Deutschlands* (Heidelberg, 1908); Redmond, *The Leather Glove Industry in the United States* (New York, 1913); "Leather Glove and Mitten Industry," vol. x, *Manufactures: Thirteenth United States Census* (Washington, 1913).

GLOVE, THE. A story originally told (about 1550) by Pierre Ronsard, and later variously adapted by Schiller, Leigh Hunt, and Browning. It tells of a lady who tosses her glove into a lion's den and commands her lover to fetch it back. He springs down and, returning unharmed, hurls it in her face in scorn at her capricious cruelty.

GLOV'ER, JOHN (1732–97). An American soldier, prominent in the Revolutionary War, born in Salem, Mass. He removed to Marblehead when very young, was a shoemaker for a time, and then engaged in the fishing business. In February, 1773, he was chosen colonel of a militia regiment which upon the outbreak of the Revolution became a part of the continental army, as the Fourteenth Regiment, better known as the "Marine Regiment." On Oct. 4, 1775, he was placed in charge, with Stephen Moylan, of the equipment and manning of armed vessels and cruisers designed for service against the British, and until July, 1776, was stationed at Beverly, Mass. He then was ordered to New York, and on the night of August 28–29, after the battle of Long Island, conducted the transfer of the American army from Long Island to New York. He was placed in command of General Clinton's brigade on September 4, took part in the battle of White Plains, and on December 25 manned the boats in which Washington and his army effected the passage of the Delaware before the attack upon Trenton. On Feb. 21, 1777, he was appointed brigadier general by the Continental Congress and afterward took an active part in the campaign against Burgoyne; was placed in charge of the British prisoners on their march from Saratoga to Cambridge; took part in General Sullivan's Rhode Island expedition in July and August, 1778; was a member of the court which tried Major André and was officer of the day when André was executed; and in July, 1782, was retired on half pay. He returned to Marblehead and seems for a time to have worked as a cobbler again. In 1788 he was a member of the Massachusetts Convention which ratified the Federal Constitution. His orderly books and a letter book containing his Revolutionary correspondence are in the possession of the Essex Institute at Salem, Mass. Consult Upham, *A Memoir of General John Glover of Marblehead* (Salem, 1863), and Sanborn, *Gen. Glover and his Marblehead Regiment* (Marblehead, 1903).

GLOVER, JOHN (1767–1849). An English landscape painter, born in Leicestershire. He was self-taught in art, having been master of the Appleby Free School from 1786 to 1794. He went to London in 1805 and joined the Water-Color Society, of which he became president in 1815. He received a gold medal at the Paris Exhibition in 1814, and in 1823 he took a prominent part in the foundation of the Society of British Artists. He went to Australia in 1831 and sent to England his sketches of native scenery, until his death in Tasmania. Glover was one of the earliest founders of the modern landscape school and of the English water-color school. He was an artist of some skill and originality, especially skillful in aërial perspective, but his work became mannered. He also painted in oils, but not with equal success. Among his water colors are views of "Tivoli," "Windsor Castle," and a "River Scene," in the South Kensington Museum. One of his best oil paintings is a "Landscape with Cattle," in the British Museum.

GLOVER, MRS. JULIA BETTERTON (1779–1850). An English actress, born at Newry. The daughter of an actor, she began to play juvenile parts about 1789. In 1795 she made her formal début as Marianne, in Reynolds's *Dramatist.* Her répertoire included Lydia Languish, Widow Green in *The Love Chase,* and the Queen in *Richard III.* Her last appearance on the stage was as Mrs. Malaprop, at Drury Lane only a few days before her death, July 16, 1850. Remarkable for her memory, she was during her middle life considered the best comic actress of the time and in later years was styled the "Mother of the Stage." Consult the memoir by Mrs. Wilson in *Our Actresses,* vol. ii (London, 1844), and Cook, *Hours with the Players* (ib., 1881).

GLOVER, RICHARD (1712–85). An English poet. He was the son of a London merchant, and after attending school at Cheam, in Surrey, he entered his father's business. In 1762–68 he sat in Parliament for Weymouth. Though he never attended either university, he acquired, it is said, a good knowledge of Greek. Be that as it may, most of his poems are founded on Greek subjects. In 1737 appeared his *Leonidas,* an epic in blank verse running through nine books, subsequently (1770) extended to 12 books. Once popular, the poem is no longer read. Its sequel, the *Athenaid* (30 books, 1787), it is hard to believe any one ever read. He wrote several heavy tragedies: *Boadicea* (1753), *Medea* (1761), and *Jason* (1799). His fame now rests upon the spirited "Ballad of Admiral Hosier's Ghost," founded on Hosier's disastrous expedition to Porto Bello (1726). For his poems consult Chalmers, *Works of the English Poets,* vol. xvii (London, 1810).

GLOV'ERSVILLE. A city in Fulton Co., N. Y., 54 miles northwest of Albany, on the Fonda, Johnstown, and Gloversville Railroad, and on the Erie Canal (Map: New York, F 4). It has a Carnegie library, Federal building, and the Nathan Littauer Hospital. Gloversville is the principal seat of the manufacture of gloves in the United States, its factories with those of the neighboring city of Johnstown controlling a large proportion of the entire production of the country. Besides gloves and mittens, there are extensive manufactures of glove and shoe leather, pocketbooks, and leather novelties. Settled during or just before the Revolution, Gloversville was known as Stump City from 1816 to 1832, when it received its present name. It was incorporated as a village in 1851 and was chartered as a city in 1890. The government, under the revised charter of 1899, is administered by a mayor, elected biennially, and a council which confirms the executive's appointments to the Board of Health and elects all other officers, except standing committees, boards of civil service and plumbing, which are appointed by the mayor. The boards of education and water commissioners are chosen by the people. The city owns and operates its water works and sewage system. Pop., 1900, 18,349; 1910, 20,642; 1914 (U. S. est.), 21,618.

GLOVE SPONGE, or Finger Sponge (so called from the branching shape). An inferior sort of commercial sponge (*Spongia officinalis*) which takes a bushy form, sometimes 2 feet high. It grows on hard bottoms all along the coast of Florida and Bermuda and is regarded as the poorest kind gathered, although closely related to the finest sort of sponge. See Sponge.

GLOWACKI, glô-väts′kê, Aleksander (1847–1912). A famous Polish writer, best known by his pseudonym "Boleslav Prus," under which he contributed popular feuilletons to the *Warsaw Courier* and the *Illustrated Weekly*. Collections of his works appeared under the titles *Tales* (1881), *Sketches and Portraits* (1885–86), *Early Tales* (1890), and in a complete edition in 1897. In his tales the humorous and lifelike portraits of children, peasants, and animals are peculiarly excellent. The best-known series of tales is *Placowka* (The Sentry), which deals with the national and economic conflict between the enterprising German colonists and the stubborn Polish peasant Slimak (Snail). *The Doll* (1891) is perhaps the most important of his novels, while *The Emancipated Women* is somewhat marred by mysticism. Among his last works was a novel entitled *The Children* (1909). His *Faraon* was translated into English as *The Pharaoh and the Priest* (Boston, 1902). His humor conceals a deep sympathy for the unfortunate, to which is added a masterful power of character analysis. Consult Konstanty Wojciechowski, *Boleslaw Prus* (Cracow, 1913).

GLOWWORM. See Firefly.

GLU′CASE (from Gk. γλυκύς, *glykys*, sweet). An enzyme also known as maltase, found in various species of yeasts, in some molds, and probably also in the seeds of germinating barley and other cereals. It is also found in various parts of animal bodies. The glucase prepared from cereals differs somewhat in its action from that obtained from fungi; the latter acts best at a temperature of 40° C., and the former is most active at 57–60° C. Glucase acts upon maltose, hydrolyzing it into two molecules of glucose. It has also been found to decompose certain glucosides. See Digestion in Plants.

GLUCI′NUM (Neo-Lat., from Gk. γλυκύς, *glykys*, sweet), or Beryllium. A metallic chemical element discovered by Wöhler in 1828. It is not found native, but occurs as a constituent of various minerals, such as beryl, chrysoberyl, and phenacite. Its existence as an oxide was recognized in beryl in 1798 by Vauquelin, but it was not until Wöhler obtained the impure metal by the action of potassium on fused glucinum chloride that the element itself may be said to have been isolated.

Glucinum (symbol, Gl or Be; atomic weight, 9.1) is a steel-colored, malleable metal that has a specific gravity of 1.93, and its melting point is about 1400° C. (about 2550° F.). It is divalent and combines with oxygen, forming *glucinum oxide*, or *glucina*, GlO, a white infusible powder with a sweetish taste. However, on the basis of the composition of its organic compounds, Tanatar considers glucinum as a quadrivalent element. With copper and certain other metals glucinum forms alloys that have valuable properties; thus, a small percentage of glucinum renders copper sonorous; an alloy of 95 per cent copper and 5 per cent glucinum is malleable, takes a polish, and is not affected by the air.

GLUCK, glụk, Alma (1886–). An American dramatic soprano, born at Bucharest, May 11, 1886. Her parents brought her as a child of five to New York. A gentleman who heard her sing was so much struck with the quality of her voice that he advised her to have it cultivated. Without any thought of a professional career she studied with Buzzi-Peccia in New York from 1906 to 1909. In the latter year her teacher induced her to sing for Mr. Gatti-Casazza, the director of the Metropolitan Opera House, who immediately offered her an engagement. She accepted, and made her début as Sophie in Massenet's *Werther* in November, 1909. During that first season she sang 11 different rôles and instantly became a prime favorite with the public. At the same time she also appeared frequently in recitals with such success that she practically withdrew from the stage. In 1912 she went to Berlin and studied for one year under Madame Sembrich (q.v.). In 1914 she married the violinist Efrem Zimbalist (q.v.).

GLÜCK, glụk, Christian Friedrich von (1755–1831). A German jurist, born and educated at Halle. In 1784 he became professor of law in the University of Erlangen, Bavaria. His principal works are *Ausführliche Erläuterung der Pandekten* (34 vols., 1790–1830; continued by other scholars, 1832–93), which was begun to supplement Hellfeld's *Elementa juris civilis* (1728), and *Handbuch zum systematischen Studium des neuesten römischen Privatrechts* (1812).

GLUCK, Christoph Willibald (1714–87). A famous German composer and operatic reformer. He was born July 2, 1714, at Weidenwang, in the Upper Palatinate, where his father was forester to Prince Eugene of Savoy, and later to Prince Lobkowitz at Eisenberg. From 1726 to 1732 the boy attended a Jesuit seminary at Komotau, where he was taught singing, violin, cello, and organ. In the latter year he went to Prague to continue his musical studies and was compelled to eke out a livelihood by playing in the neighboring villages. While there, he heard and stored away in his memory many rustic tunes which later did service in his operas. Czernohorsky, noting his aptitude, took him as a pupil. In 1736 he went to Vienna, where, through the good offices of the Lobkowitz family, he met Prince Melzi. The latter became deeply interested in the young musician and took him to Milan, where Gluck continued his technical studies with Sammartini.

Gluck was 27 years old when his first opera, *Artaserse*, was produced at La Scala. *Artaserse* led to commissions for other works, and within five years Gluck produced eight operas. His fame having reached England, he went to London in 1745 at the invitation of Lord Middlesex and produced *La caduta de' giganti* in honor of the Duke of Cumberland's victories. The time, however, was inauspicious, and *The Fall* *of the Giants* was withdrawn after only five performances. The performances of an earlier opera, *Artamene*, were more successful, while a *pasticcio, Piramo e Tisbe*, an opera loosely strung together from the best arias of his earlier works, met with a complete fiasco.

In 1748, Gluck's father having died and left him a small inheritance, he settled in Vienna, which remained his principal place of residence for the rest of his life. On May 14, 1748, in celebration of the Empress's birthday, he produced in the recently completed opera house *La Semiramide riconosciuta*, which achieved great success. The spring of 1749 found the composer in Copenhagen, where he was received with distinction and lodged in the royal palace, and where he produced a two-act serenade, *Tetide*, in honor of the recent birth of a Crown Prince (afterward Christian VII). In April of the same year he traveled in the guise of a Capuchin (for no other reason, it is believed, than to avoid trouble regarding passports) to Rome. There and in Naples he brought out a new two-act opera, *Telemacco, ossia l'Isola di Circe*, which was attended with his usual success.

Shortly afterward Gluck returned to Vienna, where, in September, 1750, he married Marianne Pergin. They soon left Vienna for Naples, where he achieved great success with his opera *La clemenza di Tito*. In 1754, having produced, and again successfully, two operas, *Il Trionfo di Camillo* and *Antigone*, in Rome, the Pope created him Chevalier of the Golden Spur, and thereafter the composer, who set great store by this title, was always careful to call himself Ritter von Gluck. Previous to this visit to Rome he had been appointed by Count Durazzo conductor of the Opera at Vienna. His productivity in this office was great, including the composition of light operas whose librettos Durazzo secured from Paris, where they were brought out with music usually by Duni and Monsigny, while the Viennese heard the same librettos with music by Gluck. Meanwhile Gluck was growing steadily in intellectual breadth. He became more and more dissatisfied with the flippant conventionalities of the Italian opera of the day, though he himself had composed an appalling number of works in that style. About 1760 he met Raniero di Calzabigi, a real poet, who held very decided views as to the possibilities of music when wedded to a real drama. It was he who furnished Gluck with the libretto to *Orfeo ed Euridice*, the first of the "reform" operas, produced in Vienna, Oct. 5, 1762. This, his first great opera, is still a famous work. Though not immediately successful, *Orfeo* soon established itself in popular favor, not only in Vienna, but also in Italy, where, at Parma, Traetta was unable to obtain a hearing for his *Armida* because every one wanted to hear *Orfeo*. Gluck's other operas in his great style are *Alceste* (1767), *Paride ed Elena* (1769) (both on texts by Calzabigi), *Iphigénie en Aulide* (Paris, 1774), *Armide* (1777), and *Iphigénie en Tauride* (1779).

The production of *Iphigénie en Aulide* in Paris was an important event in Gluck's life. It led to the hotly waged and now historic contest between the operatic reformers headed by Gluck and those who championed the existing style of opera. The latter put forward Piccini to oppose Gluck, but Gluck was overwhelmingly victorious. In 1780 he returned to Vienna, but ill health prevented him from accomplishing anything of importance, and he died in that city, Nov. 15, 1787. Gluck's reform of the opera was his greatest service to music. He found it marred by senseless embellishments, and a mere vehicle for the display of singers' voices; he left operatic music restored to its original purpose of expressing musically the meaning of the words to which it was composed and of emphasizing the dramatic situation, and in this reform the share of Calzabigi is scarcely less important than that of Gluck himself. In two prefaces, printed in the scores of *Alceste* and *Paride ed Elena*, the master explains his views in detail. Consult: A. B. Marx, *Gluck und die Oper* (Berlin, 1863); E. Newman, *Gluck and the Opera* (London, 1895); A. Reissman, *Christoph Willibald von Gluck* (Berlin, 1882); J. d'Udine, *Gluck, biographie critique* (Paris, 1906); J. Tiersot, *Gluck* (ib., 1910).

GLÜCKSBERG, Duke of. See Decazes, L.

GLÜCKSTADT, glụk′shtȧt. A town in the Prussian Province of Schleswig-Holstein, on the Elbe, 32 miles below Hamburg (Map: Germany, C 2). It is intersected by canals; has a Gymnasium, railway repair shops, shipyards, fruit and vegetable canneries, manufactories of furniture, wagons, mirrors, soaps, shoes, saddlery, bricks, cigars, etc. The fisheries are important. When the Elbe is icebound the harbor, which is large and deep, receives much of the Hamburg shipping. Glückstadt was founded in 1617 by Christian IV of Denmark, fortified, and endowed with various commercial privileges. During the Thirty Years' War it successfully withstood three sieges; its fortifications were demolished by the allies in 1815. Pop., 1900, 6586; 1910, 6555.

GLU′COSE (from Gk. γλυκύς, *glykys*, sweet). Glucose is a carbohydrate, and it is customary to speak of this simple sugar also as dextrose and grape sugar. The latter name is given to it on account of its occurrence in the juice of the grape and of other ripening fruits and also to distinguish it from cane or beet sugar. It is also contained in honey. In the vegetable kingdom it is widely distributed, where it plays an important rôle in the economy of plant life. It is also found in the animal body, and the human blood may have as much as 0.1 per cent under healthy conditions.

The molecular formula of glucose is $C_6H_{12}O_6$, and it is called a carbohydrate because the molecule contains carbon, hydrogen, and oxygen, the H and O being present in the same proportion as in water (H_2O).

Glucose can be readily prepared from starch by hydrolyzing with dilute sulphuric or hydrochloric acid. It may also be prepared from cellulose and cane (sucrose), beet (sucrose), milk (lactose), or malt (maltose) sugar, but in most of these cases other sugars are split off with the dextrose. Thus cane or beet sugar when treated with an acid or the ferment invertase (present in yeast) yields equal parts of glucose and levulose. The name "invert sugar" is given to the products of hydrolyzation of cane or beet sugar. Levulose accompanies dextrose in the juice of fruits.

In appearance chemically pure glucose is white, and it is less sweet in taste than cane sugar. Unlike cane sugar, it never separates in well-defined, clear crystals from either water or alcohol. It is usually met with as a crystalline, crusty powder. It is very soluble in water and less so in ethyl and methyl alcohol.

Either glucose anhydride or hydrate crystallizes from strong concentrated aqueous or strong alcoholic solutions at temperatures of 30° to 40° C. and as hydrate from water at room temperature. The needle-like crystals of the anhydride melt at 140° C. and the hydrate at 80 to 100° C. (176° to 200° F.).

Glucose deflects the ray of polarized light to the right (dextroglucose) and when first polarized shows a variable rotation (mutarotation), which rises or sinks to a constant level after a number of hours. Glucose reduces cupric hydroxide (mixed Fehling's solution) to copper oxide. This fact and the degree of polarization are utilized when determining glucose in foods, etc. Heating glucose with a decinormal sodium hydroxide solution for a number of hours at 37° C. destroys it. Cane sugar when present in the same solution is not decomposed, and this constitutes a method for separating cane sugar from glucose. By heating glucose at a temperature of 170° C. or over, it becomes brownish and loses much of its sweetness and is converted into glucosan ($C_6H_{10}O_5$). When heated between 200 and 220° C., it is converted into caramel, a brown coloring matter principally employed for coloring artificial vanilla extract, beers, whiskies, confectionery, etc.

On oxidation glucose yields three acids, viz., gluconic, glucuronic, and saccharic. Physiologically considered, glucuronic acid is the most interesting because it is frequently found in the urine combined with a variety of substances and in the sugar beet combined with a resin acid.

Under normal conditions glucose is rapidly oxidized in the animal body, to which it furnishes heat and energy.

Glucose is fermentable by the zymase contained in yeast and also by the ferments of some molds and bacteria. Before starch, malt, or cane sugar can be fermented, it is necessary to convert the first two into glucose, and cane sugar into glucose and levulose. Upon the fermentability of glucose by yeast the manufacture of alcohol, wine, beer, distilled liquors, cider, and bread depends. (See BEER.) Alcohol is not always the final product resulting from the fermentation of glucose, and in many cases lactic acid, acetic acid (see VINEGAR), and butyric acid are formed.

Commercial Glucose. The first person to prepare sugar from grapes was Proust (1800–01); but, according to Wichelhaus, Kirchhoff must be regarded as the real discoverer of the conversion of starch into glucose. According to Gaissicourt, however, Fourcroy and Parmentier in 1781 produced sugar from starch, but the value of the reaction was not appreciated at that time.

In the United States the term "glucose" to the brewer, candy maker, leather manufacturer, etc., has come to mean an almost transparent, sirupy liquid composed of dextroglucose, maltose, dextrin, and water prepared from cornstarch by heating with dilute acids. In Europe, especially in Germany, the product is usually prepared from potato starch and takes the name of starch sirup. Quite often cornstarch is prepared in the same establishment where glucose is manufactured, and here the two processes make up a large industry.

For the manufacture of glucose from corn, the grain is first softened by treatment, for two or three days, with water containing a small percentage of sulphurous acid, then coarsely ground, and then treated with "starch milk" (a mixture of starch and water) of such a density that the lighter embryos, or "germs," float on the surface, whence they are removed, while the heavier parts of the kernels sink to the bottom of the liquid. The "germs" are dried and sold for stock feed after the extraction by hydraulic pressure of the oil they contain. This oil is found in commerce under the name of corn oil, or maize oil. The parts of the kernel that sink are finely ground. The starch is thus set free, so that it can be separated from the ground grain by washing on sieves. It is afterward purified by successive mixing with water and sedimentation, or by deposition on "starch tables," over which the washings from the sieves are allowed to flow. The starch, which is much heavier than water and the impurities from which it is to be freed, collects at the bottom of the settling vats in a hard white layer which, when drained, is called "green starch" and is ready for conversion into glucose. The residue retained by the sieves and the nitrogenous matter, as well as the small amount of starch left in the wash waters, are collected, pressed, dried, and sold for stock feed. See GLUTEN MEAL AND GLUTEN FEED.

For converting the starch into glucose (hydrolysis), sulphuric acid is now very generally used. For certain products sulphuric acid in mixture with a minute quantity of nitric acid is employed. Hydrochloric and oxalic acids are also used for this purpose. The operation is conducted in steam-heated, closed copper "converters," under a pressure of two or three atmospheres (30 to 45 pounds per square inch). This high pressure greatly lessens the quantity of acid and time necessary for conversion. In the case of sulphuric acid from one to three pounds are used per 100 pounds of dry starch; in the case of hydrochloric acid only one-half to three-quarters of a pound of the concentrated acid is necessary. The starch is mixed with a considerable quantity of water before the acid is added; the time required for the conversion varies from 10 to 30 minutes, according to the character of the required product. By the action of the acid the starch is first converted into dextrin and maltose; by continued treatment these bodies are changed to dextroglucose. As the liquor comes from the "converter," the acid is neutralized with chalk or marble dust, if sulphuric acid is used, or with soda if hydrochloric acid is used. In the former case the gypsum, or sulphate of lime, formed crystallizes out and is separated by filtration; in the case of hydrochloric acid the neutralization product is sodium chloride (common salt). This product cannot be used for all purposes on account of its salty taste. The neutralized liquid is decolorized by filtration through boneblack and concentrated in vacuum evaporators to form a sirup.

Other products manufactured in glucose factories from starch are solid substances rich in dextrose (glucose) and containing a minimal amount of dextrin and maltose. These are the so-called grape sugars of commerce. In manufacturing these products the time required for heating with dilute acid is longer than for making glucose sirup. The products occur in the hydrous and anhydrous forms.

The following analyses of starch sugar products are taken from *Bulletin 66* of the Bureau of

Chemistry, United States Department of Agriculture:

COMPOSITION OF COMMERCIAL GLUCOSE AND STARCH SUGAR

DESCRIPTION	Water	Ash	Dextrose	Maltose	Dextrin
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Neutral glucose sirup	18.00	.259	14.00	33.40	30.99
XXX glucose	18.34	.459	14.53	38.24	26.53
70 per cent sugar	18.56	.837	68.71	1.79	2.89
80 per cent sugar	10.34	.796	79.28	.90	3.68
Anhydrous grape sugar	6.18	.351	86.43	2.02	.88

According to the thirteenth census the amount of glucose manufactured during 1909 was 769,660,210 pounds, and its value was $17,922,514. The grape sugar manufactured during the same year amounted to 159,060,478 pounds and had a value of $3,620,816. In 1904 the money value for each of these commodities was $12,352,616 (glucose) and $2,254,745 (grape sugar).

Among the products of glucose factories those of greatest commercial importance are "mixing glucose," used by sirup and molasses manipulators; "jelly glucose," used in making jellies from evaporated apple juice and other materials; "confectioners' glucose"; "brewers' glucose," used as a substitute for malt in brewing; and "anhydrous grape sugar." Well-made glucoses must be regarded as a perfectly wholesome product, as they are composed of substances of frequent and abundant occurrence in foods that have been in use from time immemorial, and which are similar to the products into which starch is normally transformed by the processes of digestion. The objection to their use in the preparation of foods lies mainly in the fact that the consumer is frequently misled in regard to the value of the commodities containing them, and that they are frequently used in the fabrication of inferior, artificial or highly diluted, or otherwise adulterated goods.

Consult: Wagner, *A Practical Treatise on the Manufacture of Starch, Glucose, Starch-Sugar, and Dextrin*, translated by Frankel and Hutton (Philadelphia, 1881); Hallock, *Bibliography of Starch-Sugar* (Washington, 1884); O. Hammarsten, *A Text-Book of Physiological Chemistry*, trans. by J. A. Mandel (New York, 1909); *Thirteenth Census of the United States Taken in the Year 1910: vol. x, Manufactures, 1909, Reports for Principal Industries;* E. F. Armstrong, *The Simple Carbohydrates and the Glucosides* (New York, 1912); H. Wichelhaus, *Der Stärkezucker* (Leipzig, 1913); B. Tollens, *Kurzes Handbuch der Kohlenhydrate* (ib., 1914).

GLUCOSIDE, glo͞o′kō-sĭd. A name given to a number of complex organic substances which occur principally in the plant kingdom. As a class, they are generally colorless, crystalline, bitter substances and can be obtained by extracting the plant with water or alcohol. They have the common property of yielding a sugar—usually glucose—when decomposed with either an acid or appropriate ferment, and one or more organic substances classed with the alcohols, aldehydes, phenols, etc. Thus, amygdalin found in bitter almond, the kernels of the peach, apricot, plum, and other stone fruits belonging to the Rosaceæ, when treated with the ferment emulsin, is decomposed into glucose, benzaldehyde, and hydrocyanic acid. In most cases the ferment which hydrolyzes the glucoside is present in the same plant or seed, but in different cells. Glucosides which give off hydrocyanic acid, a strong poison, are termed cyanogenetic, and their detection is a matter of the utmost importance when they occur in beans used as a food for man and in animal fodders.

Digitonin, a glucoside contained in *Digitalis purpurea* (foxglove), a heart stimulant, on decomposition yields when decomposed (hydrolyzed) both glucose and galactose, while hesperidin, found in the unripe orange, and quercitrin, in the black oak (*Quercus tinctoria*), yield a pentose sugar called rhamnose.

Again salicin, a glucoside, the active principle of willow bark and used as a remedy against fever and rheumatism, is hydrolyzed by emulsin to glucose and saligen, and gaultherin, contained in *Gaultheria procumbens*, yields methyl salicylate, which is essentially oil of wintergreen. Sinagrin and sinalbin, found in black and white mustard respectively, when hydrolyzed by myrosin, yield mustard oils, glucose, etc.

The real biological function of glucosides in the economy of the plant is not known, but is suggested as protective. Many of the glucosides have been produced artificially. Consult Haas and Hill, *An Introduction to the Chemistry of Plant Products* (New York, 1913), and E. F. Armstrong, *The Simple Carbohydrates and the Glucosides: Monographs on Biochemistry* (ib., 1912).

GLUE (from OF. *glu*, bird lime, from Lat. *glus*, glue; connected with Gk. γλοιός, *gloios*, glue, Eng. *clay*). An inferior grade of gelatin, prepared on account of its adhesive qualities, for use in the arts and industries and particularly in the various branches of woodworking. A preparation of glue or other gelatinous material for glazing the surface of a textile fabric, paper, or other material is known as "size." With the development of the textile, paper, and allied industries, the use of glue as sizing has enormously increased the demand for this article and its consequent commercial importance. The best glue-making material is the corium, or true skin of the animal, that portion lying beneath the epidermis and inner layer of fat, which is also used for the manufacture of leather. The glue extracted from the bones of animals is inferior in adhesive qualities unless prepared by the acid process, which is expensive. The softer bones of an animal yield the better glue. Fish glue is made from the skin, scales, and muscular tissue of some of the larger fish, especially cod, and is, of course, a very different product from true isinglass (q.v.). In its adhesive powers it resembles hide glue, but it retains an offensive odor. The raw material of most glue factories is chiefly composed of the waste from slaughterhouses and from leather manufactories—the trimmings of hides and bones, and scraps of leather or pieces of old leather which was cured by some other process than tanning. Glue, however, cannot be made from material in which the slightest trace of tannic acid remains.

The method of glue manufacture varies with the character of the material employed. In making glue from hide the scraps are first limed, to facilitate the removal of adhering hair, flesh, and fat, as in the manufacture of leather (q.v.). This process requires from 10 to 40 days, after which the skins are washed and dried. Instead of lime, caustic soda or sulphurous acid is sometimes used for cleansing the glue stock. The prepared stock is converted into glue by the application of heat, and the solution, separated from the impurities and foreign matter, is filtered off and concentrated, after which it is cooled in thin layers on flat surfaces. By an older method the pieces are placed in flat-bottomed copper boilers, which have perforated false bottoms placed a little above the true ones, to prevent the burning of the materials. The whole is kept at a gentle boiling heat until the gelatinous part has boiled out, and the mass of the material has sunk down into the fluid. The boiler is at first filled with soft water for two-thirds of its depth. The boiling is sustained until, by repeated trials of small quantities, the operator knows the fluid to be of the right consistency, when it is drawn off to the congealing boxes; a fresh lot of material is often added to the residue left in the boiler, and the process is repeated. Recently the use of steam, either indirectly in closed pipes or directly in perforated pipes, or else blown under high pressure directly into the closed vessel containing the mixture, has been found to expedite the process and improve the quality of the glue. After boiling, the glue is allowed to settle, or is strained through linen bags to free it from impurities. The waste thus recovered, consisting of fat, hair, and other matter, is utilized in the manufacture of fertilizers, while the glue itself is subjected to a process of drying. Drying is likely to prove a troublesome process, requiring great care, as the glue readily spoils at this stage. Once drying was accomplished in the open air, but recent practice is to place the glue in specially prepared drying rooms, where the temperature and humidity can be carefully regulated. The glue is dried in shallow wooden molds, or "coolers," and the tablets are laid in wire netting. Thence it is removed to a smooth-topped table, whose surface has been moistened to prevent sticking, and here it is cut, by means of wires, into pieces of the desired shape and size. Fish glue is made by a similar process of treating with hydrochloric acid, washing, liming, and boiling with water.

Bone glue is extracted by boiling the bones, which have been previously treated with a solution of hydrochloric acid, to remove the calcium phosphate. The powdered bones are kept in a solution of dilute hydrochloric acid for several days. They are then allowed to stand in lime water for a few hours, after which the gelatin is extracted by means of boiling water or steam, as in the preparation of hide glue. The calcium phosphate recovered from the bones is used as fertilizing material, and the fat is also utilized.

Liquid glue is prepared from a solution of dried glue by the action of nitric or acetic acid, which checks its tendency to gelatinize without diminishing its adhesive qualities. An excellent liquid glue may be made by mixing four parts of transparent gelatin, four parts of strong vinegar, one part of alcohol, and a small amount of alum. Consult Taggart, *The Glue Book* (Toledo, O., 1913).

The glue industry in the United States dates from 1837, when Peter Cooper produced the first American-made glue. Since that time it has developed steadily, and the thirteenth United States census of manufactures (1913) reported that in the year 1909 the glue industry embraced 65 establishments, employing an average number of 3265 wage earners, with an annual product valued at $13,717,820—an increase in the value of product from 1899 of 154.6 per cent. Illinois ranked first, in 1909, in the value of its product, supplying 27.5 per cent of the total, being followed by New York and Pennsylvania with 21.8 per cent and 14.9 per cent respectively. The 65 establishments had an aggregate capital of $14,288,674, with aggregate expenses for the year of $11,759,336.

A series of tests of ordinary glue were reported before the 1914 meeting of the American Society for Testing Materials by O. Linder and E. C. Frost. In making the tests they considered the principal qualities to be covered were: viscosity of the melted solution, strength of the cold jelly (judged by the fingers), odor, reaction, grease content, liability to foaming, ash, moisture, appearance. The method of testing was to glue a 2 × 1 × 1 inch block between two 2 × 1 × 1½ inch pieces, pressing together under 100 pounds' pressure for 12 hours, and after another 12 hours pushing the middle block from between the others on a testing machine. It was found that in the 25 samples tested the strength developed varied from 1100 to 1950 pounds per square inch for one part dry glue to three parts of water, and 60 to 70 per cent of this amount for a one to five glue. It was further found that prolonged heating of glue lowered its strength, and, if kept heated to 150° F. for 20 hours, a loss of from 20 to 45 per cent in strength was shown in testing. Consult: Davidowsky, *Glue, Gelatine, Cements, and Pastes* (Philadelphia, 1905); Lambert, *Glue, Gelatine, and their Allied Products* (London, 1905); Fernback, *Glues and Gelatine* (ib., 1907); Standage, *Agglutinants of All Kinds* (ib., 1907).

GLUE, Marine. A waterproof cement made by dissolving one part of finely divided pure gum rubber in 12 parts of naphtha or benzine, adding 20 parts of powdered shellac, and digesting at a gentle heat until the shellac is dissolved. The hot fused mass is poured on plates of metal or stone, and allowed to cool in thin sheets. For use, it is melted and applied with a brush. Owing to its property of resisting moisture, it is much used in shipbuilding, to unite surfaces exposed to water, and is also valuable as a cement for glass, metal, and stone.

GLUGÆA BOMBYCIS, glōō-jē′ȧ bŏm-bī′sĭs. A parasite of the silkworm, which formerly did immense injury to the silk industry of France.

GLUKHOV, ġlōō′ᴋȯv. The capital of a district of the same name in the Russian Government of Tchernigov, situated on the Yesmana, 180 miles south-southeast of Tchernigov (Map: Russia, D 4). The chief occupation is agriculture; the trade is insignificant. The town existed as early as the twelfth century and passed to Lithuania in the fourteenth century and later to Poland. It was the seat of the hetmans of Little Russia. Pop., 1897, 14,856.

GLUME, glōōm (Lat. *gluma*, husk, from *glubere*, to peel, Gk. *γλύφειν*, *glyphein*, to carve). The characteristic bract which distinguishes the inflorescence of grasses, which on this account are often spoken of as "glumaceous plants." See Gramineæ.

GLÜMER, gly̨′mẽr, Adolf von (1814–96). A German soldier. He was born at Lengefeld and, entering the Prussian army in 1831, won rapid promotion, participated in the Austro-Prussian War of 1866, and then was commander of the Thirty-second Infantry Brigade. In the Franco-German War he especially distinguished himself, serving as a division commander at Spichern, Forbach, Gravelotte, and Metz, and taking a prominent part in the battle around Belfort. In 1873 he was Governor of Metz and retired from active service. In 1878 the German Emperor intrusted him with the task—which he had to give up in 1880—of unifying the Imperial army.

GLÜMER, Claire von (1825–1906). A German author, born at Blankenburg in the Harz Mountains and educated chiefly in France. Her translations include works of Swift, Daudet, George Sand, Turgenev, Tolstoy, and others. Among her novels and romances are: *Düstere Mächte* (1870); *Vom Webstuhl der Zeit* (1882); *Junge Herzen* (1890); *Es giebt ein Glück* (1897). The story of her childhood is told in *Aus einem Flüchtlingsleben* (1904).

GLU′TEN (Lat., glue). One of the most important constituents of the varieties of grain used as food. It is obtained by mixing flour with water and thus forming a paste or dough. This paste is placed in a bag of fine linen and kneaded in water, which must be repeatedly changed, till it ceases to assume a milky appearance. A gray, tenacious, viscous, tasteless substance, having the appearance of birdlime, is left in the bag. This substance consists mainly of gluten, mixed with traces of bran starch and of oily matter. The gluten thus obtained from wheat and from rye is far more tenacious than that which is obtained from the other cereals, and it is the great tenacity of this constituent that especially fits these flours for conversion into bread. It is found, by analysis, that the proportion of gluten contained in wheat grown in hot countries is considerably higher than in wheat grown in colder countries; and the hard, thin-skinned wheats contain more of this ingredient than the softer varieties of the grain. The quantity of gluten usually found in flour varies from 8 to 15 per cent. Gluten in a moist state rapidly putrefies, the mass acquiring the smell of decaying cheese; but when dry, it forms a hard, brownish, horny-looking mass, that does not very readily decompose. Gluten is composed mainly of two protein substances, *gliadin* and *glutenin*, which are present in approximately equal quantities. The action of gluten in the manufacture of bread is probably a double one; it induces, by constant action, an alteration of the starch, and subsequent fermentation, while by its tenacity it prevents the escape of carbonic-acid gas.

The large quantities of gluten obtained as a by-product in the manufacture of starch are at present utilized for the manufacture of certain articles of food. The cohesive properties of gluten are destroyed, or rather suspended, by the action of dilute acids or alkalies, but are restored again by the addition of salts. Wet gluten, when first extracted, contains two parts by weight of water for every one part of true gluten.

GLUTEN MEAL AND GLUTEN FEED. By-products resulting in the manufacture of starch or glucose from the starch of the corn kernel. Their principal use is as a feeding stuff for farm animals. The products differ greatly in composition according to the process of manufacture which is followed. Gluten feed is the entire residue of the kernel, including the germs and hulls. Gluten meal, cream gluten, and similar materials sold under a variety of trade names, do not contain the corn hulls. Some factories extract a part of the fat from the gluten meal; others mix the gluten meal with the hulls and germs without extracting the fat and sell it as gluten feed. The dried products from the same factory vary considerably in composition from time to time, so that although a very large number of samples of gluten meal and feed have been analyzed by the experiment stations, no very constant figures can be given for percentage composition. In general, the gluten meals are richer than the gluten feeds. These meals contain from 20 to 40 per cent of protein, the average being about 30 per cent, and from 6 to 20 per cent of fat, with an average of nearly 12 per cent. The carbohydrates constitute about 45 per cent, and the fibre varies with the completeness of the separation of the hulls, rarely amounting to over 3 or 4 per cent. The gluten feeds usually contain about 24 or 25 per cent of protein, although the product from some factories has been below 20 per cent and of others over 30 per cent. The fat varies less than in gluten meal, averaging about 10 per cent; and the carbohydrates are higher, averaging over 50 per cent. Like other corn products, none of these materials contain much ash—less than 1 per cent usually.

Gluten meal and feed are both quite digestible, from 85 to 90 per cent of the protein, 90 to 95 per cent of the carbohydrates, and 85 to 95 per cent of the fat being digested by ruminants. They are highly prized as feeding stuffs, especially for dairy cows, and are now very extensively used over the northeastern part of the United States. Gluten meals, when fed to cows in considerable quantity, cause a slight softening of the butter, but give a product of good quality. Gluten meal is also a satisfactory feed for fattening steers and for pigs.

GLUT HERRING. A "river herring" (*Clupea æstivalis*), closely related and similar to the alewife and often confused with it in the market, although considered inferior. It is more commonly known on the New England coast as "blueback."

GLUTIN. See Gelatin.

GLUT′TON. The English name for the European representatives of the circumpolar carnivore known in North America as the wolverine (*Gulo luscus*). The fables to which it owes its name, and the equivalents in all European languages, are sketched and considered by Dr. Elliott Coues in his *Fur-Bearing Animals* (Washington, 1877). In the early books about animals this denizen of forests, popularly supposed to be more or less filled with hobgoblins anyhow, was represented as a ravenous monster of insatiate voracity, matchless strength, and supernatural cunning. For the real character of the animal whose name perpetuates these foolish calumnies, the reader is referred to the article Wolverine, and the Plate of Fur-Bearing Animals.

GLYCE′RIA. See Manna Grass.

GLYCERIN, glĭs′ĕr-ĭn, **GLYCEROL,** glĭs′ẽr-ōl (from Gk. γλυκερός, *glykeros*, sweet, from γλυκύς, *glykys*, sweet), or Propenyl Alcohol, $C_3H_5(OH)_3$. An organic chemical compound, used for a variety of purposes in the arts and in medicine. Perfectly pure glycerin is a crystalline solid substance melting at 17° C. (62.6° F.); but the merest traces of impurities prevent it from crystallizing, and it is therefore usually obtained in the form of a thick sirupy liquid that boils at 290° C. (554° F.). Small quantities of salts cause it to decompose to some extent when distilled. Glycerin mixes in all proportions with water and alcohol and readily absorbs moisture if exposed to the air, but, owing to the three hydroxyl groups contained in its molecule, it does not mix with ether, chloroform, carbon disulphide, benzene, and many other organic liquids. On the other hand, it forms an excellent solvent for a variety of substances, both inorganic and organic. It is colorless and odorless, but has a distinctly sweet taste. Its specific gravity at 15° C. (59° F.) is 1.265. Glycerin is obtained in large quantities in the manufacture of soap and of candles. It is well known that natural fats are largely used in the manufacture of these products, and as fats consist mainly of glycerides, i.e., compounds of glycerin with fatty acids, glycerin is set free when the fats are decomposed, or "saponified." It is thus obtained, in more or less dilute aqueous solution, through the saponification of fats with lime or with superheated steam. To separate the glycerin from the dilute solution, the latter is somewhat concentrated by evaporation, filtered through boneblack, and then further evaporated *in vacuo.* To render it fit for use in medicine and in the manufacture of nitroglycerin, the product thus obtained is further purified by distillation with superheated steam before it is brought into the market. Finally, to eliminate, for scientific purposes, the last traces of impurities in the commercial product, the latter may be again mixed with water, filtered through carefully purified boneblack, and evaporated *in vacuo.* In medicine glycerin is used chiefly as a vehicle for applying externally many substances, such as the alkalies, neutral salts, bromine, iodine, alkaloids, tannic acid, etc., the glycerin solutions of which are readily absorbed by the skin. If injected into the rectum, glycerin relieves constipation, its action being speedy, painless, and followed by no constitutional disturbance. Very large doses of glycerin taken internally are liable to cause loss of muscular strength, lethargy, and even death. In the arts glycerin is employed mainly in the manufacture of nitroglycerin, from which many valuable modern explosives are made; nitroglycerin is the trinitrate of glycerin, $C_3H_5(NO_3)_3$, obtained by the action of a mixture of nitric and sulphuric acids on glycerin. Glycerin is further used as a preservative fluid for small and delicate anatomical preparations and has been applied to the preservation of meat and other foods; it has been added to the water in gas meters, with the view of preventing it from freezing in winter and from evaporating too rapidly in summer. It is also used in the manufacture of toilet soap, of parchment paper, and of printers' rollers, in the textile industry, etc.

Chemically glycerin is a triatomic alcohol, its constitutional formula being $CH_2(OH).CH(OH).CH_2(OH)$. When the hydrogen of its hydroxyl groups is replaced by metals or by organic acid radicals, alcoholates or esters respectively are obtained. Fats are mixtures containing, in various proportions, mainly the esters which glycerin forms with oleic, palmitic, and stearic acids. The hydroxyl groups of glycerin may be readily replaced by chlorine or bromine, one or two atoms of chlorine being thus substituted by the direct action of hydrochloric acid, while the third hydroxyl group may be replaced by chlorine by the action of phosphorus pentachloride. Besides the method described above, by which glycerin is made on an industrial scale, it may be prepared by the action of potassium permanganate on allyl alcohol, and it is produced in small quantities during the alcoholic fermentation of sugars. By the action of acid potassium sulphate or other dehydrating agents on glycerin, or simply by distilling impure glycerin under ordinary atmospheric pressure, acrolein is produced according to the following chemical equation:

$$\underset{\text{Glycerin}}{C_3H_8O_3} = \underset{\text{Acrolein}}{C_3H_4O} + \underset{\text{Water}}{2H_2O}$$

When carefully oxidized with dilute nitric acid, glycerin is transformed into glyceric acid, $CH_2(OH).CH(OH).COOH$. Usually, however, the products of oxidation of glycerin are oxalic, carbonic, and glycollic acids.

Glycerin was discovered by Scheele in 1779; Chevreul demonstrated its existence, in the form of glycerides, in the fats; its composition was determined by Pelouze, and its chemical constitution by Berthelot and Wurtz. Finally, Charles Friedel, in collaboration with Silva, succeeded in effecting the complete synthesis of glycerin from its chemical elements; their method, however, is too complicated to be described here.

Imports of glycerin into the United States are about 35,000,000 pounds annually, valued at about 12 cents per pound. In 1913 imports were 34,414,000 pounds, chiefly from France and England.

GLYCERRHIZA, glĭs′ẽr-rī′zȧ. See Licorice.

GLY′CINE (from Gk. γλυκύς, *glykys*, sweet), Glycocine, Glycocoll, Sugar of Gelatin, or Amino-Acetic Acid, $CH_2(NH_2)COOH$. An organic chemical compound of carbon, hydrogen, oxygen, and nitrogen, discovered by Braconnot in 1820. It forms colorless, transparent, rhombic prisms, which have a sweet taste and are devoid of odor. It is very soluble in water, but is insoluble in alcohol and in ether. Glycine combines both with acids (as hydrochloric, nitric, sulphuric, and oxalic acid) and with metallic oxides, and the compounds in both cases are soluble and crystallizable; they are, however, of no great importance. Glycine is usually prepared by subjecting hippuric acid to prolonged boiling with hydrochloric acid, benzoic acid being produced at the same time. It is also sometimes prepared synthetically, by the action of ammonia, or ammonium carbonate, upon monochloracetic acid, according to the following chemical equation:

$$\underset{\text{Nonochloracetic acid}}{CH_2(Cl)COOH} + \underset{\text{Ammonia}}{2NH_3} = \underset{\text{Glycine}}{CH_2(NH_2)COOH} + \underset{\text{Ammonium chloride}}{NH_4Cl}$$

Glycine exists in the animal body only in combination; it is one of the chemical components of hippuric acid and glycollic acid, two substances of considerable physiological importance. It is, further, one of the products obtained by boiling gelatin with acids or with alkalies and is produced also when uric acid is subjected to the action of hydriodic acid.

GLY′COCINE. See Glycine.

GLY′COCOLL. See Glycine.

GLY′COGEN (from Gk. γλυκύς, *glykys*, sweet + -γένης, *-genēs*, producing, from γίγνεσθαι, *gignesthai*, to be born), or Animal Starch.

An organic substance found in small amounts in all tissues of the body, lymphoid, blood, and pus cells. In larger quantities it is found in the liver of mammals, particularly after the ingestion of large quantities of carbohydrate food. It is also found in large amounts in the muscles of mollusks, oysters, clams, and scallops.

Glycogen is a carbohydrate closely related to the starches or dextrins, with the general formula $(C_6H_{10}O_5)_n$. It forms an amorphous, white, tasteless, and inodorous powder. With water it gives an opalescent solution which is dextrorotatory, the specific rotation being $[\alpha]_1 = +196.57°$. The solution is colored wine red by the addition of iodine. Glycogen is separated out of its solutions by various reagents, such as, barium hydrate, acetic acid, tannic acid, and phosphotungstic acid. It may be salted out of its solutions by means of either magnesium sulphate or ammonium sulphate. Boiling with dilute mineral acids converts glycogen, like starch, gradually into dextrose. This is also accomplished by diastatic enzymes present in various plant and animal tissues and animal secretion. Yeast does not ferment glycogen into alcohol. This is, however, accomplished by yeast press juice which contains diastatic enzymes which first convert glycogen into dextrose. The conversion of glycogen into dextrose may also be accomplished by photocatalysis and by electrolysis. The heat of combustion of glycogen has been determined for 1 gram = 4190 cal., and for 1 gram molecule = 678.9 cal. It may be prepared by plunging into boiling water, immediately after death, the liver of an animal (rabbit) which has been fed on large amounts of carbohydrates. The organ is then macerated and boiled several times with fresh water. The combined filtered extracts are concentrated and allowed to cool. The proteids are removed from it by alternate precipitation with potassium mercuric iodide and hydrochloric acid. From this solution the glycogen is precipitated by the addition of large volumes of alcohol. The uses of glycogen in the animal economy are noticed in the article LIVER (q.v.).

GLY'COL (from *glyc*-erin + alcoh-*ol*), or more properly, ETHYLENE GLYCOL, $C_2H_4(OH)_2$. A thick liquid, having a sweet taste and boiling at 197.5° C. (387.5° F.). It cannot be mixed with ether, owing to the two hydroxyl groups (OH) contained in its molecule; but mixes in all proportions with water and ordinary alcohol. It may be prepared by heating ethylene dibromide with an aqueous solution of potassium carbonate, evaporating the resulting solution at a gentle heat, extracting the semisolid residue with a mixture of alcohol and ether, and subjecting the solution thus obtained to fractional distillation. Ethylene glycol is the simplest substance of the group of glycols, or diatomic alcohols, a general description of which may be found under ALCOHOLS. A detailed account of the glycols was given by their discoverer, Adolphe Wurtz, in a lecture delivered before the Chemical Society of Paris. Consult Pasteur, Cahours, Wurtz, etc., *Leçons de chimie professées en 1860* (Paris, 1861).

GLYCOL'LIC ACID, or HYDROXYACETIC ACID, $CH_2(OH).COOH$. A compound of carbon, hydrogen, and oxygen, which is at once an acid and a primary alcohol. It may be prepared from monochloracetic acid by boiling a concentrated solution of its potassium salt in water for a number of hours, then distilling off most of the liquid under reduced pressure, and diluting the residue with acetone: at first potassium chloride separates out, but after that the filtered mother liquor deposits a mass of crystals of glycollic acid. Pure glycollic acid melts at 78.9° C. (174° F.). Glycollic acid is contained in beet juice and is the principal acid constituent of sugar-cane juice.

GLY'CON (Lat., from Gk. Γλύκων, *Glykōn*). An Athenian sculptor, who lived probably in the first century A.D. He executed the celebrated colossal marble statue of the Farnese Hercules, discovered in the baths of Caracalla in 1540. After adorning the Farnese Palace for some time, it was removed to the Royal Museum at Naples. It represents the hero resting on his club after one of his labors and is supposed to have been copied from the Heracles of Lysippus (q.v.). No ancient writer mentions Glycon, but ΓΛΥΚΩΝ ΑΘΗΝΑΙΟΣ ΕΠΟΙΕΙ (Glycon, the Athenian, made it) is engraved on the rock which supported the statue. Consult Brunn, *Geschichte der griechischen Künstler* (Brunswick, 1853), and E. A. Gardner, *A Handbook of Greek Sculpture* (London, 1911).

GLY'COSU'RIA (Neo-Lat., from Gk. *γλυκύς*, *glykys*, sweet + *οὖρον*, *ouron*, urine). A symptom of diabetes mellitus. See DIABETES.

GLY'KAS, MICHAEL. A Byzantine historian. Little is known of his life. His *History of the World*, from the earliest times to 1118, is a valuable work of reference and contains many interesting references to theological and other matters. The best edition of the work was published by Bekker (Bonn collection, 1836). Glykas is said to have been imprisoned and blinded about the middle of the twelfth century. A poem, containing nearly 600 verses, addressed to the Emperor Manuel Comnenus, is valuable as one of the earliest examples of vulgar Greek.

GLYN, ELINOR (?–). An English novelist, daughter of Douglas Sutherland, of Toronto, Ontario. In 1892 she married Clayton Glyn, of Harlow, Essex. She made Paris her residence. Among her published books are: *The Visits of Elizabeth* (1900); *The Reflections of Ambrosine* (1902); *The Damsel and the Sage* (1903); *Vicissitudes of Evangeline* (1905); *Beyond the Rocks* (1906); *Three Weeks* (1907), a great success because of its almost scandalous audacity; *The Sayings of Grandmama* (1908); *Elizabeth Visits America* (1909), with the author's impressions of the United States; *His Hour* (1910); *The Point of View* (1913; called *The Contrast* in England); *The Sequence* (1913); *Your Affectionate Godmother* (1914).

GLYNN, JOHN (1722–79). An English politician and lawyer. He studied at Exeter College, Oxford, but got no degree. Called to the bar in 1748, he soon became famous for his wide knowledge of law and for his radical position in politics. He was the valuable friend and adviser of John Wilkes, and acted for him in many cases. Wilkes said of Glynn, "He was a Wilkite, which I never was." In 1772 he was counsel for an alderman named Townsend in a suit against a land tax, in which he urged the nullity of Parliament on the ground of irregular elections. In 1768 he was elected to Parliament after an exciting campaign, marked by much violence and corruption; in the next year he presented the Middlesex petition, and in 1770 urged a committee to inquire into cases in regard to the press.

GLYNN, Martin H. (1871–). An American public official, born at Kinderhook, N. Y. He graduated from St. John's College, Fordham, in 1894, and in the following year became managing editor of the Albany *Times-Union.* He served in the 56th Congress (1899–1901), and was comptroller of New York State (1906–08). He was elected Lieutenant Governor in 1912, and on Aug. 14, 1913, became acting Governor, although William Sulzer (q.v.) still continued in the duties of that office; but after Sulzer was removed by the Court of Impeachment Glynn assumed full control, Oct. 18, 1913. He received the degree of LL.D. from Syracuse University in 1914. After he became Governor, Glynn frequently reiterated his early statement that he was independent of Tammany Hall, and he claimed to have effected great economies in the State government. In 1914 he was successful in the direct primaries, winning the Democratic gubernatorial nomination in a contest with John A. Hennessy (q.v.). Though supported by both Tammany and the Wilson administration, Glynn was defeated, in a Republican landslide, by Charles S. Whitman.

GLYNNE, Sir John (1603–66). An English jurist and Parliamentarian. He was born at Glynllifon, Carnarvonshire, and was educated at Westminster School and Oxford. Called to the bar in 1628, by 1639 he was a leading member of the famous Long Parliament and shared in the impeachment of Strafford. He was recorder of the city of London for six years (1643–49) and retired on an annual pension of £300. Though a stout adherent of Cromwell and a most able prosecutor of his would-be assassins, Glynne was no Republican and urged the Protector to call himself King. After the Restoration he devoted his great abilities as judge and advocate to the service of Charles II, bringing to trial some of his former associates. But he was no ordinary turncoat, though he so figures in Pepys's *Diary* and in *Hudibras,* and he remained true throughout to the Presbyterian party.

GLYOXYL'IC ACID, $CHO \cdot COOH$. A compound of carbon, hydrogen, and oxygen, found in various fruits, including unripe apples, currants, grapes, and gooseberries. Chemically it is closely related to glycollic acid (q.v.) and is at once an aldehyde and an acid. In its salts, however, its aldehyde group is changed by hydration to the usually unstable group $CH(OH)_2$. Crystalline glycollic acid, too, has been shown to have the formula $CH(OH)_2COOH$.

GLYP'TICS. The art of engraving, particularly as applied to the carving of precious stones. It is now generally performed by means of diamond dust and diamond-pointed instruments. In addition to gems the engraving of various substances, such as coral and ivory, and unusually hard woods, such as box and ebony, is included under this head. See Engraving; Gems; Intaglio.

GLYP'TODON (Neo-Lat., from Gk. γλυπτός, *glyptos,* carved + ὀδούς, *odous,* tooth, in allusion to the sculptured grinding surface of the teeth). A gigantic extinct edentate mammal allied to the armadillo, and of which fossil remains are found in the Pleistocene deposits of South America and less commonly in Mexico, Texas, and Florida. The animal had a solid carapace made up of mostly hexagonal plates arranged in transverse rows, like those of the armadillo, but solidly united, so that the creature was unable to curl up. These bony plates were often ornamented by grooves or tubercles and were covered by horny epidermal scales. The tail also was incased in a sheath of strongly nodular bony plates. The head likewise had, in some species, a coat of mail of small plates. The skull is high, narrow, and short, with a peculiar long process descending from the zygomatic arch. Both the jaws have eight molar teeth on each side, each of which is divided into three vertical prisms by two deep lateral grooves, and the form of the crown sculpturing is very peculiar. The legs are heavily built, the feet large, and the fingers are short and armed with thick hooflike claws. The latter character shows that the animal could not have been a burrower like the armadillo. The best-known species is *Glyptodon clavipes* of the Pleistocene beds of Argentina, which attained a length over all of about 17 feet. An allied genus is *Dœdicurus,* of even larger size than *Glyptodon,* with a smooth carapace pierced by many cavities, and a longer tail formed of five or perhaps six movable rings, terminated by a club-shaped tube, which seems to have borne movable spines or bosses at its extremity.

Consult: Huxley, "On the Osteology of the Genus Glyptodon," *Collected Memoirs,* iii (London, 1898); Lydekker, "The Extinct Edentates of Argentina," in *Anales de Museo de la Plata, Paleontologia Argentina,* vol. iii, part ii (La Plata, 1894); Scott, *A History of Land Mammals in the Western Hemisphere* (New York, 1913). See Edentata.

GLYP'TOTHE'CA, or **GLYPTOTHEK'** (Ger., from Gk. γλυπτός, *glyptos,* carved + θήκη, *thēkē,* chest). A building or room for the preservation of sculpture. Such buildings were common in ancient times. Cicero gives a minute description of one. The most famous modern gallery of sculpture called by this name is the Glyptothek in Munich (q.v.); another is the Ny-Karlsberg Glyptothek in Copenhagen.

GMELIN, gmā'lĕn, Christian Gottlob (1792–1860). A German chemist, born in Tübingen, and for many years professor of chemistry and pharmacy in the university of his native city. His discovery of the artificial preparation of ultramarine was highly important in its bearing on manufacturing industry. His principal work is entitled *Einleitung in die Chemie* (1833–37).

GMELIN, Johann Georg (1709–55). A German botanist. He was born in Tübingen, was educated in the university there, and in 1731 became professor of chemistry and natural history at St. Petersburg. In 1733, by order of the Empress Anne, he joined Deslisle, G. F. Müller, and Bering in an expedition for the exploration of Siberia, which country they penetrated as far as the Lena. He returned to St. Petersburg in 1743. In 1749 he was chosen professor of botany and chemistry at Tübingen. He published *Flora Sibirica* (1747–69) and *Reise durch Sibirien* (1751–52). Linnæus named a genus of plants *Gmelina* in his honor.

GMELIN, Leopold (1788–1853). A German chemist. For several generations members of the Gmelin family have distinguished themselves in science. Leopold's father, Johann Friedrich, held professorships of natural history and medicine at Tübingen and Göttingen. Leopold was professor of medicine and chemistry at Heidelberg from 1817 to 1851. In 1820 he undertook, in conjunction with Tiedemann, a series of experiments on digestion, and in 1826 they published their celebrated work on the subject, in two volumes, under the title *Die Verdauung.* Gmelin is famous chiefly, however, for his admirable and elaborate *Handbook of Chemistry* (1817–19), which was subsequently revised and enlarged by Kraut; Gmelin-Kraut's *Handbuch* is well known to every student of chemistry. An English translation of the work (under the auspices of the Cavendish Society), with important additions by Watts, the translator, was published in the course of 1848–59. Consult obituary in the *Journal of the Chemical Society* (London, 1855).

GMELIN, Samuel Gottlieb (1743–74). A German botanist and traveler, nephew of J. G. Gmelin. He was born in Tübingen, graduated there in 1763, went to St. Petersburg in 1767, and in 1768, with Güldenstadt and Lapuchin, entered on a journey for the scientific exploration of the southeastern possessions of Russia. When on his way back to St. Petersburg, he was seized as a hostage by Usmey Khan, of the Kaitak tribe, and died from the results of his ill treatment. He published: *Historia Fucorum* (1768); *Reisen durch Russland* (1771–84); and other works.

GMELINA, mĕl′ĭ-nȧ *or* mē-lī′na (Neo-Lat., named in honor of the German traveler J. G. Gmelin, 1709–55). A genus of trees of the family Verbenaceæ, with heart-shaped leaves and panicles of flowers consisting of a small four or five toothed calyx and a large obliquely bell-shaped corolla. *Gmelina arborea,* called goombar or koombar in Hindustan and the Eastern Peninsula, where it is widely distributed and attains a great size, is valuable for its timber, which resembles teak, but is closer in grain and lighter. It is used for many purposes, such as foundations for buildings, decks of boats, Venetian blinds, picture frames, etc. It bears exposure to water better than do most kinds of timber. This tree has been successfully grown in the south of Florida and in California. In Australia there are two species that yield important timber—*Gmelina macrophylla* and *Gmelina leichhardtii.* The latter attains a height of 120 feet, with a diameter of 4 feet, and is one of the most valuable timbers of the country, where it is known as beech or white beech, although it is in no way related to the white beeches of Europe and America. The sapwood of the former species is mottled, heavy, close-grained, and valuable.

GMÜND, gmụnt. A town of the German Kingdom of Württemberg, situated in the beautiful valley of the Rems, about 32 miles southeast of Stuttgart (Map: Germany, C 4). It was formerly an Imperial city, and its walls and towers still remain. The most noteworthy churches are the Romanesque church of St. John and the fourteenth-century church of the Holy Cross, with a sculptured portal and a carved altar. The thirteenth-century Dominican monastery of Gotteszell is now used as a prison, and the church of St. Salvator, hewn in a cliff outside the town, is visited by many pilgrims. Gmünd has a Gymnasium, a trade school in working the precious metals, and a Catholic teachers' seminary. The manufactures are wooden and iron articles, bronzes, cigars, chronometers, wax goods, flour; but the chief industry is making jewelry and other gold and silver goods. Gmünd, first mentioned in the eleventh century, became an Imperial free city in the thirteenth century and retained its independence until 1803. It is the birthplace of Heinrich von Gmünd, one of the architects of the Milan Cathedral. Pop., 1900, 18,699; 1910, 21,270.

GMÜND, Von. A German family of stone cutters. For the more important members, see Parler, Peter.

GMUNDEN, gmụn′den. A favorite summer resort and watering place of Upper Austria, charmingly situated at the north end of Lake Traun, 1395 feet above sea level, about 50 miles northeast of Salzburg (Map: Austria, C 3). It has a seventeenth-century Catholic church with a fine carved wood altar, a new sanatorium, a Gymnasium, and a brewery. It is well built and lighted by electricity, and has beautiful promenades and many handsome villas in the environs, which offer many chances for excursions. Pop., 1900, 7126; 1910, 6699.

GNAT, nāt (AS. *gnæt*). A name applied to several kinds of small flies and in England to mosquitoes. Having been replaced by "mosquito," the word is becoming obsolete in North America. The commonest form to which it is still applied are the fungus gnats (Mycetophilidæ) and the gall gnats of the family Cecidomyiidæ. The fungus gnats are mosquito-like, but are easily recognized by the great length of the coxal (or uppermost) joint of the leg. They are found in great numbers on fungi and around decaying vegetable matter found in damp places. They can leap actively as well as fly. The gregarious larvæ live in such vegetable matter. In some species the larvæ before pupating will form a marching army in which the individuals are four to six deep. The gnats of the dipterous genus *Sciara* frequently swarm in houses during summer evenings. The gall gnats have the body and wings covered with long hairs, that are easily lost. The larvæ are small maggots, often bright-colored, and live in plants, in which they form galls. The Hessian fly that infests wheat belongs here, and also the resin gnat that infests pine. See Fungus Gnat; Gall Gnat; Mosquito; Black Fly.

GNAT CATCHER. A small insectivorous bird, related to the Old World warblers, and peculiar to America, especially to Central and South America. About 15 species are known, of which three reach the United States. The coloration is bluish ash, paler below; tail black and white. They are said to be good singers. The commonest species is the blue-gray gnat catcher (*Polioptila cœrulea cœrulea*), which is found in the southeastern United States, in summer breeding as far north as southern Pennsylvania and New Jersey, from the Atlantic to the Pacific. It breeds throughout its range, making a singularly beautiful nest in the form of a tiny cup, set upon the upper side of a lofty tree limb, and coated with lichens until it simulates a mossy excrescence. A western subspecies occurs on the Pacific coast and two other species are found in the southwestern United States, near the Mexican border.

GNATHO, nā′thō. A sycophant in Terence's *Eunuchus,* and in later comedy the typical name for a parasite.

GNATHOBDELLIDA, năth′ŏb-dĕl′lĭ-dȧ (Neo-Lat. nom. pl., from Gk. γνάθος, *gnathos,* jaw + βδέλλα, *bdella,* leech). The order of worms of the class Hirudinea which includes those leeches that have no proboscis, as the common parasite leech, the horseleech, the land leech, and related forms. See Leech.

GNATIA, nā′shĭ-ȧ, or **EGNATIA**, ĕg-nā′shĭ-ȧ. An ancient town in southern Italy, on the Adriatic Sea, 38 miles southeast of Barium (see Bari), mentioned by Horace, *Satires*, i, v, 97, in his account of his journey from Rome to Brundisium, as lacking in good water, and as the seat of a supposed fire miracle (consult Pliny, *Historia Naturalis*, ii, 107, 240). In Roman times the town had a lively trade because of its position on the sea and at the junction of important roads. The ancient city, which some locate near Monopoli, others at Torre d' Anazzo, near Fasano, has disappeared, but important finds have been made in its tombs; these are to be seen in the museum at Bari. Consult the article "Gnathia," in Lübker, *Reallexikon des klassischen Altertums* (8th ed., Leipzig, 1914).

GNATSNAPPER. A name given to certain Old World birds that seize insects on the wing, often with an audible snap of the beak, such as the bee eater (q.v.).

GNAUTH, gnout, Adolf (1840–84). A German architect, born in Stuttgart, where he was educated at the Polytechnic Institute. In 1861–63 he studied in Italy, whither, after a stay in Vienna, he went again, in 1864, to collaborate with Emil von Förster in making the designs for Raschdorff's *Palastarchitektur von Oberitalien und Toscana* (Berlin, 1883). He was once more in Italy during the summer months of 1867–69, painting large-sized water colors of the monuments of the Renaissance for the Arundel Society in London. Appointed professor at the Polytechnicum in Stuttgart in 1870, he resigned in 1872, in order to execute orders for the erection of a number of private buildings. He visited Greece and Egypt in 1875, Spain and southern France in 1882, and became director of the Industrial Art School at Nuremberg in 1877. An adherent of the late Renaissance style, he adapted in an original manner the palatial architecture of Italian cities to his structures.

GNEDITCH, gnā′dĭch, Nicolai Ivanovitch (1784–1833). A Russian poet. He was born at Poltava and was educated at the University of Moscow. He went to St. Petersburg at the age of 19 and was employed there in the Ministry of Education and in the Imperial Public Library. He devoted especial attention to translation of the classical poets of Europe, his best work in that field being the Russian version of the *Iliad* (latest ed., 1880). The work was begun in 1809 and completed in 1829 and is a masterpiece of versification. He wrote several original poems of high merit and translated into Russian some works of Shakespeare, Voltaire, Schiller, and other European poets.

GNEISENAU, gnī′z*e*-nou, August Wilhelm Anton, Count Neithardt von (1760–1831). A Prussian field marshal and one of the most prominent figures in the War of Liberation. He was born at Schildau in Prussian Saxony, Oct. 27, 1760. In 1777 he entered the University of Erfurt and two years later joined an Austrian regiment. In the following year he entered the service of the Margrave of Ansbach-Bayreuth and in 1782 went to America as an officer in the mercenary force raised by Great Britain in Germany. He returned, however, in the following year without having seen any actual fighting. In 1786 he entered the Prussian service as lieutenant of infantry. The next 20 years, with the exception of a year's active service in Poland in 1793–94, were spent in the quiet of garrison life. During this time, however, Gneisenau became a profound student of military and political history. In 1806 he took the field against Napoleon and fought at Saalfeld and Jena. He was raised to the rank of major and was intrusted, in April, 1807, with the defense of Kolberg, which was invested by a large French army. With the aid of Schill and Nettelbeck he carried on a heroic resistance against the greatly superior forces of the French until hostilities were concluded by the Peace of Tilsit. For his services he was raised to the post of chief of engineers, received the Prussian order "pour le mérite," and was made a member of the council to which was intrusted the task of reorganizing the Prussian state, which had exhausted its forces in the disastrous war against Napoleon and had been dismembered by the Peace of Tilsit. In this work of national revival he coöperated heartily with Stein and Scharnhorst, and though primarily devoted to the problem of military reorganization, exercised considerable influence on the general policy of the ministry. After Stein's dismissal he resigned (1809), owing to the hostility of Napoleon, and from 1811 to 1813 was intrusted with secret missions to Austria, Sweden, Russia, and England. Upon the outbreak of the War of Liberation in 1813, he became a general in the corps of Blücher and subsequently chief of staff to the army of Silesia. In this position Gneisenau displayed remarkable strategic talents, a relentless energy, and a daring which contributed in no small degree to the success of the Prussian arms. He became lieutenant general after the battle of Leipzig and upon the return of Napoleon from Elba was made once more chief of staff under his old commander, Blücher. After the repulse of the Prussians at Ligny, June 16, 1815, he executed a skillful retreat, and to him was due, in large measure, the opportune arrival of the Prussians on the battlefield of Waterloo (June 18). After the decision of the battle he led the pursuit, turning the French retreat into a complete rout. He was made Governor of Berlin in 1818 and field marshal in 1825. Soon after the outbreak of the Polish insurrection of 1830 he was assigned to the command of the Prussian corps on the Polish frontier, but he died at Posen, Aug. 24, 1831. Gneisenau has assumed in Prussian history the dimensions almost of a national hero. He was with Stein, Scharnhorst, and York, one of the small band of patriots who in the hour of Prussia's deepest degradation never despaired of their country, and later, when an opportunity offered for overthrowing Napoleon, devoted themselves to the destruction of the hateful French domination. In Gneisenau, moreover, ardent patriotism was combined with a most lovable nature, marked by natural gentleness and refined by years of study and by travel. There is a monumental life of Gneisenau, *Das Leben des Feldmarschalls Grafen Neithardt von Gneisenau*, in five volumes, by Pertz and Delbrück (Berlin, 1864–80); a shorter biography, *Das Leben des Feldmarschalls Grafen Neithardt von Gneisenau*, was published by Delbrück in two volumes (2d ed., ib., 1907). Consult also Neff, *Die Heldenlaufbahn des Generals der Infanterie August von Gneisenau* (ib., 1889), and Pick, *Aus der Zeit der Not, 1806 bis 1815* (ib., 1900).

GNEISS, nīs (Ger., probably connected with OHG. *gneista*, Icel. *gneisti*, AS. *gnāst*, Eng. *gnast*, spark). A family of rocks belonging to the metamorphic series and resembling granite in composition. Gneisses are granular aggregates of feldspar and quartz, with mica, hornblende, or pyroxene, and some of the rarer metals. Their structure is characterized by a parallel arrangement of the constituents; the light and dark minerals alternate in bands or layers, which are sometimes so regular and distinct as to give the appearance of stratification. Owing to this peculiarity, many geologists hold that they are metamorphosed sediments. There is conclusive evidence, however, that the parallel arrangement may be brought about in rocks of truly igneous origin, either as a result of movements of the constituents while the magma is in process of solidification, or by compression and shearing strains after the rock mass has solidified. Some gneisses, doubtless, have resulted from the metamorphism of sediments; but in such cases the proof is not based primarily upon the gneissoid character. Neither the igneous nor the sedimentary theory of origin is to be accepted for gneisses as a class, and each occurrence must be studied by itself. For this reason geologists have come to use the term "gneiss" in its structural sense, without implying anything further as to origin or constituent minerals. When it is desired to define the composition of a particular type, other rock names are united with the term; e.g., granite gneiss, syenite gneiss, gabbro gneiss, or granitic gneiss, syenitic gneiss, gabbroic gneiss. Gneisses are the most widely distributed of metamorphic rocks (q.v.) and are found underlying the earliest sediments in almost all parts of the world. They are important quarry materials, and many of the so-called granites that are employed for structural stones are really gneisses, as indicated by their foliated textures. Consult Kemp, *Handbook of Rocks* (New York, 1900), and Pirsson, *Rocks and Rock Minerals* (ib., 1911). See GEOLOGY.

GNEIST, gnīst, RUDOLF VON (1816–95). A German jurist and statesman, born in Berlin, Aug. 13, 1816. He was graduated from the University of Berlin and while occupying the post of lecturer in the university practiced the profession of law. From 1841 to 1844 he traveled through Italy, France, and England, making a comparative study of the law system of these countries. In 1844 he became professor extraordinary of jurisprudence, and in 1850 he resigned his position as assistant judge of the Superior Court to devote himself more exclusively to teaching and especially to further the interests of the National Liberal party. In 1858 he became a member of the Lower Prussian House, where he served till 1893. He was prominent as a Liberal in that body and in the Reichstag, of which he was a member from 1867 to 1884. Gneist was an active member of the Liberal opposition, and subsequently of the National Liberal party, among whom his profound scholarship made him an intellectual leader. Several of his ablest works relate to the English constitution, which he greatly admired, and which he studied and cited as a model in the discussion of German affairs. In 1888 Frederick III raised him to the nobility. His first notable work was *Geschichte und heutige Gestalt der Aemter in England* (1857). Other important works of special interest to English students and appearing in English translations are *Englische Verfassungsgeschichte* (1882), which is perhaps his greatest single piece of work, and *Das Englische Parlament* (1886). He also wrote *Der Rechtsstaat* (1872) and numerous other works on the history of jurisprudence and legislation. Consult Gierke, *Rudolf von Gneist* (Berlin, 1895).

GNESEN, gnā′zen (Pol. *Gniezno*). A town in the Province of Posen, Prussia, capital of a district of the same name, situated between hills and lakes, 31 miles east-northeast of Posen (Map: Germany, G 2). Its old and noteworthy cathedral, begun in the tenth century, is adorned with fine paintings, bronze doors, and chapels, and contains the tomb of St. Adalbert, who was Bishop here, and first preacher of the gospel in Prussia. There are also an archiepiscopal palace, a theological seminary, a college, a Gymnasium, and a monument to Emperor Frederick III. The manufactures include machinery, lumber, leather, dairy products, sugar, and flour. It has a large trade in cattle, horses, and grain. Tradition fixes the year 550 as the date of the foundation of Gnesen, one of the oldest towns in Poland. It became an archiepiscopal seat in 1000 and during the Middle Ages was for a time the residence of the Polish kings, who were crowned here until 1320. The archbishops of Gnesen were primates of the realm and acted as vicars during the frequent interregnums. Pop., 1900, 21,693; 1910, 25,339, including many Poles.

GNETALES, nē̇-tā′lēz (Neo-Lat. nom. pl., from *Gnetum*, from Malay *gnemon*, the native name). One of the great groups of gymnosperms, which comprises at present three genera, that differ remarkably in habit and habitat. The genera are *Ephedra*, with about 30 species, from the arid regions of both hemispheres; the very peculiar *Welwitschia*, from certain extremely arid regions of western South Africa; and *Gnetum*, with about 15 species, from the tropics of both hemispheres. The species of *Ephedra* are low, straggling shrubs, with long-jointed and fluted green stems, and opposite, scalelike leaves connate into a two-toothed sheath. The body of *Welwitschia* has the shape of a gigantic radish, which rises little above the surface of the ground, and whose crown is sometimes 12 to 15 feet in circumference. From the edge of the crown two enormously long, parallel-veined leaves arise, which extend upon the ground sometimes for 10 to 15 feet, and become split into numerous ribbons. This single pair of opposite leaves, the only pair produced, grows continually at the base and lasts through the lifetime of the plant, which is said to reach more than 100 years. The species of *Gnetum* are either small trees or woody climbers and are among the prominent lianas of tropical forests. The foliage is leathery in texture and suggests dicotyledons, as the well-developed opposite leaves are lanceolate to ovate in outline and pinnately net-veined. See Plate of GYMNOSPERMS.

The group is of special interest to the botanist on account of the display of certain angiospermous characters that have suggested that Gnetales may have given rise to the angiosperms. The characters that distinguish the group from other gymnosperms are the occurrence of true vessels in the secondary wood and the presence of a so-called perianth. In addition to these two distinguishing characters, the group has the following four characters in common, but not peculiar to it: (1) opposite leaves, (2) dicotyledonous embryos, (3) cauline ovules, and (4) no resin ducts. Some fossil forms have been found in the later deposits that suggest Gnetales in appearance, especially *Ephedra*, but such evidence is not trustworthy. At present Gnetales are unknown as fossils, but they give evidence of an extended history. Their great dissimilarity in habit, structure, and habitat, associated with their widely scattered distribution, indicate a relatively large group of ancestors of somewhat general distribution.

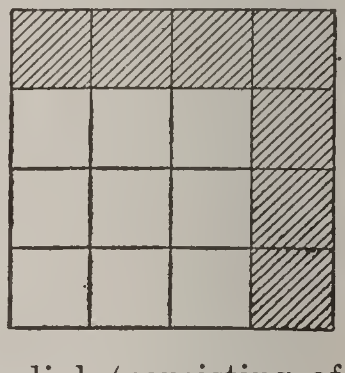
GNOLI, nyō′lē, Domenico (1839–). An Italian author, born in Rome. He attracted public attention by his volume of poems published under the pseudonym of "Dario Gaddi," and a collection of critical essays, *Odi tiberine*, classic in style. He was professor of Italian literature at Turin and in 1893 was made prefect of the Library Vittorio Emanuele at Rome. He collaborated on the *Nuova Antologia* and founded and was a director of the *Archivio Storico dell' Arte*. Besides translations of the *Römische Elegien* of Goethe and various other German classics, he published several volumes of verse under the name "Giulio Orsini." Many of his original essays were published in the *Nuova Antologia*. His other writings are: *E morto il re* (1882); *Canto dei pellegrini alla tomba del gran re* (1883); *Le opere di Donatello in Roma; Il banco d' Agostino Chigi; Jacovello*, poems (1905), showing an entirely new manner of exquisite sentimentality as opposed to the sculptural intellectuality of his earlier work. His critical studies, especially of the *Risorgimente*, are admirable. He became famous as a lecturer.

GNOME, nōm (Fr. *gnome*, apparently from Gk. *γνώμη*, *gnōmē*, knowledge, or from *γνώμων*, *gnōmōn*, one who knows, from *γιγνώσκειν*, *gignōskein*, to know). A name given in the cabalistic and mediæval mythology to one of the classes of beings which are supposed to be the presiding spirits in the operations of nature in the mineral and vegetable world. They have their dwelling within the earth, where they preside specially over its treasures, and are of both sexes, male and female. (See Incubus; Kobold.) The males are often represented in the form of misshapen dwarfs. They are supposed to be the special guardians of mines and miners. In later times the word has been loosely used as the equivalent of "elf" or "fairy."

GNOME (Gk. *γνώμη*, knowledge, judgment, maxim). A short and pithy proverbial saying, often embodying a moral precept. Such sayings have been common among nearly all nations at some period of their development; examples are plentiful in the Bible. In Greece the period when men began to express in a proverbial form general maxims of conduct was the age of the Seven Wise Men. The gnomic form of expression became also a characteristic of much of the lyric poetry of the period, and such poetry as had this characteristic was called at a later time *gnomic* (*γνωμικός*). Lyric poets in whose verse this gnomic character prevailed or was prominent are Solon, Theognis, Phocylides, Simonides of Amorgus, and Xenophanes; of these Theognis is the most important, since his gnomic writings are well preserved. In gnomic poetry the source of moral philosophy has been found. The Romans had a great fondness for short and pithy sayings, which they called *sententiæ*. Such *sententiæ* characterize all Latin writing, but especially the writers of the late Augustan age and of the first century A.D., e.g., Publilius Syrus, Lucan, and Juvenal. There are editions of the gnomic poets by Brunck (Strassburg, 1817), Schäfer (Leipzig, 1817), and Bergk, *Poetæ Lyrici Græci*, vol. ii (4th ed., ib., 1882). Consult also: Opsimathes, Γνῶμαι; *sive Thesaurus Sententiarum et Apophthegmatum* (ib., 1884); Haskins and Heitland, ed. of Lucan, pp. lxv–lxix (London, 1887); Wright, *A Short History of Greek Literature*, 81 ff. (New York, 1907); Murray, *A History of Ancient Greek Literature*, 84 ff. (ib., 1897).

GNOME OWL. A name given both to the burrowing owl (q.v.) and to the pygmy owl (q.v.) of the western United States.

GNOMON, nō′mŏn (Gk. *γνώμων*, one who knows). The name given to odd numbers by Pythagoras. An odd number of the form $2n + 1$ was known to be the difference of two square numbers $(n + 1)^2$ and n^2. This doubtless arose from the geometric conception of a gnomon as the difference between two squares or rectangles; e.g., take a square of side 3 (see figure) and extend its length and breadth one unit. The resulting figure is a square of area 16. The difference of these squares, 16—9, or 7, represents an odd number, or gnomon. The term "gnomon" was also applied to a kind of sundial (consisting of a staff through the centre of three concentric circles), used not only for measuring time during the day, but also for ascertaining the periods between the solstices and for finding altitudes of the sun and stars. As a scientific instrument, it is said to have been introduced into Greece by Anaximander (610–546 B.C.).



GNOSTICISM, nŏs′tĭ-sĭz′m (from *gnostic*, from Lat. *gnosticus*, Gk. *γνωστικός*, *gnōstikos*, relating to knowledge, from *γνωστός*, *gnōstos*, knowable, from *γιγνώσκειν*, *gignōskein*, to know). The name given to related systems representing a wide movement which flourished in the Church of the second century. Like much of the philosophy of that time, the Gnostic systems were syncretistic, drawing their materials from Jewish, Christian, and pagan (Oriental) sources. They were cosmological rather than theological in character, their aim being to describe how the cosmic order was originally projected, then lost, and finally restored.

Gnosticism arose outside the Church, but soon entered it. Even before the close of the New Testament we find warnings against a "false" knowledge (1 Tim. vi. 20), which doubtless refers to some kind of Gnostic speculation already judged to be dangerous to the faith. The letter to the Colossians combats ideas which show elements of Gnosticism. Nevertheless, Gnostic ideas were long current within the Church, and often during the early period they were maintained without offense. Ignatius of Antioch, at the beginning of the second century, uses Gnostic language in speaking of Christ as the Logos of God, "who proceeded from silence." (*Ep. to Magnesians*, 8.) And in 2 *Clement*, 14, we meet again with Gnostic terms, where the preacher says: "I do not suppose ye are ignorant that the living Church is the body of Christ, for the Scripture saith God made man male and female. The male is Christ, and the female is the Church." In other words, the Christian

Gnostics were Christian theologians, though the system had already developed from Oriental mythologies before it came into contact with Christianity. Their leaders were persistent in maintaining that they drew their inspiration and authority from apostolic sources. So Valentinus traced his connection with Paul through one Theudas; Basilides with St. Peter through Glaukias. (Clement of Alexandria, *Stromata*, vii, 17.) We learn from Epiphanius that Ptolemy declared he had the authority of "apostolic tradition" for what he taught. In this respect the Gnostics pursued the same course as the ancient Catholic church. But when Irenæus wrote his great work, *Against Heresies* (180–190 A.D.), the Church had already begun to distinguish between "ordinary" (i.e., orthodox) Christians and Gnostics, whom Irenæus calls "heretics." We may therefore infer that about this time the exclusion of Gnostics from Church fellowship was beginning. After the close of the second century, whenever the claims of "knowledge" are freely advanced and maintained by prominent writers (as, e.g., by Clement of Alexandria and Origen), it is a permissible Christian Gnosticism which they are describing and defending, not the Gnostic heresy which the Church had by that time rejected. To Clement the Christian is the only true Gnostic. (*Stromata*, vii, passim.)

Most of the Gnostic literature has perished, though several extensive treatises from Coptic represent a late form of the movement, and we are forced to rely upon its orthodox opponents for most of our information concerning the heresy. Our most important witnesses are Irenæus, Tertullian, Hippolytus, and Epiphanius; but light is also cast upon its early forms by Ignatius and Justin Martyr. Gnostics were numerous after the end of the first century and found in widely separated localities. (For the names of the leaders and sects, see GNOSTICS.) Their teachers differed from one another in details and in some important doctrines; nevertheless, a remark made by Hippolytus in his account of the serpent worshipers (*Refutatio*, v, i) might be applied to all Gnostics alike: "Their detached heresies are essentially one." The sects were all religions of redemption. All held some sort of dualistic theory of the world—that spirit and matter, good and evil, are essentially opposed to each other. Whatever comes in contact with matter shares in its contamination; therefore the supreme God cannot be the Creator of the world. Of the supreme God indeed hardly anything can be predicated. He (It) is wholly transcendent, utterly remote from all that we know as existing. We might even call Him (It) the "Nonexistent," as does Hippolytus. From information given mainly by Irenæus in his work *Against Heresies* we are able to construct an outline of the teaching of Valentinus, from which the place occupied by the Creating God will appear in due course. At the two extremities of thought are transcendent Deity and the Void, or Emptiness (κένωμα). Between them there is no connection or communication. No world exists, nor is there any creative agency to produce a world. There is a series of divine beings, or powers, called Æons (αἰῶνες), which emanate in pairs from the First Cause, with diminishing dignity as they proceed. These Æons together constitute the Pleroma (πλήρωμα), or Fullness of divine existence, as over against the Kenoma, or great Void. They are symbolized as male and female; e.g., Nous (νοῦς, mind) and Aletheia (ἀλήθεια, truth); Logos (λόγος, word or reason) and Zoe (ζωή, life). The total number is 30, corresponding to the unknown and mysterious years of Christ's life, before He began His public ministry. They are arranged in groups of an Ogdoad, a Decad, and a Duodecad. One of the lowest and feeblest Æons, Sophia (σοφία, wisdom), rashly attempts to mount up to a union with the great First Cause, or Father of All, and thereby interrupts the order or equilibrium of the whole system, which is the Gnostic "fall." Part of Sophia sinks to the great Void and produces a son, the Creator, or Demiurge (δημιουργός, which suggests Plato's creating god), who proceeds to form the visible world, including man. He is the Jehovah of the Old Testament, the only God known to the Jews. He, ignorant of the Pleroma, supposes Himself to be the Supreme Being. The material creation, being more or less directly the consequence of an interrupted order, is itself by nature evil. And this evil quality, from which nothing material escapes, includes the human race. See DEMIURGE.

The problem of redemption for the Gnostics was to restore the lost cosmic order, to remedy the evil caused by the weak and erring Sophia, to liberate those sparks of Deity which had become entangled in the meshes of evil matter and in man. Christ is an instrument in the accomplishment of this task—Himself an Æon indeed, who was joined with the human Jesus of Nazareth from the time of his birth, or of his baptism to his crucifixion. This union was *docetic*, i.e., only a seeming. The heavenly Christ did not in fact suffer or die, but left the man Jesus before his death on the cross. (See DOCETÆ.) Christ's office, so far as men are concerned, was to teach the true "knowledge," to make Gnostics, to impart the secrets of that system to which He Himself belonged. The redeemed are those who can receive this esoteric teaching and become free from the flesh. Their salvation is only an incident in the vast process of restoring the lost harmony of the Pleroma. This salvation is from ignorance—a very different matter from the Christian idea of being saved from sin.

According to the ethical system of the Gnostics, all men are divided into three classes, according as they have, or have not, elements of Deity within them; spiritual or pneumatic men (πνευματικοί); animal or psychic men (ψυχικοί); and carnal or physical men (σαρκικοί, σωματικοί). The Gnostics themselves constitute the members of the first group; they will be saved through their knowledge of the esoteric system and through their ascetic life. The third group are wholly material and cannot be saved, for their nature is evil; they have no single spark of the divine within them. In the intermediate class ordinary Christians are found, persons who have not the higher knowledge, yet who may possibly —at least some of them—be saved through faith (πίστις), which is vastly inferior to "knowledge." In the practical relations of life the Gnostics applied their principles in one of two ways. Although these seem diametrically opposed to each other, yet each was supported by an appeal to the logic of their principle that matter is essentially evil. Some said: The body, being composed of evil matter, should be denied in its every tendency and impulse—whence resulted asceticism. Others said: It may be indulged in every physical gratification and even abused through overuse—whence resulted libertinism and sensuality. All the nobler Gnostics adopted the ascetic life, and some of them pushed it to an extreme (as, e.g., the Encratites). The opposite theory of self-indulgence was advocated and practiced by such sects as the Carpocratians, the Nicolaitans, and the Cainites.

The traces of Christian teaching in this system are manifest. But not less evident is the influence of Hellenic and Oriental speculation. Harnack has coined a phrase which is already proverbial (the "acute Hellenizing of Christianity"), to describe the progress of Gnosticism. The attempt to Hellenize Christianity and explain away its doctrines in the light of the "higher knowledge" was parallel to the line which heathen philosophers had taken with popular theology, which they admitted contained some manner of truth accommodated to the ignorance of the multitude. So Gnosticism would admit the necessity of faith for the vulgar multitude, but reserved the "higher knowledge" for the few who were fitted to receive it. This knowledge was superior to and independent of the faith. The central idea of Gnosticism made it welcome to many who were half converted from heathenism. The æsthetic instinct, which was the soul of Greek and Roman culture, revolted at the authority of the Church, which imposed the same belief on all, and exacted the same submission from philosopher and slave alike. In a system of compromise like Gnosticism, it escaped this ignominy.

In the course of the Gnostic controversy the Church defined her theory of the ancient Catholic standards, as the tests of orthodoxy, viz., the rule of faith, the canon of Scripture, and the episcopate, each of these being regarded as of apostolic origin and authority. Upon them she relied not only for vindicating the truth of her doctrine and the sole validity of her practice, but also for proving the falsity of her opponents' position. With these standards once generally recognized, the Gnostics, who were in the minority, could be, and were, shut out from Christian fellowship. This development was under way long before the close of the second century and was practically complete in the age of Cyprian (c.250 A.D.), when Gnosticism had already become a negligible factor. In fact, after Marcion, in the middle of the second century, Gnosticism is of little practical importance, though its tendencies reappear in the Manichees and Manichæan sects of the Middle Ages.

Gnostic Writings. Basilides' 24 books on the Gospel, entitled *Exegetica*, have for the most part perished, along with other early heretical works, but we have some quotations from them in the early Christian literature. There is at present no way of verifying Origen's statement that Basilides wrote a gospel of his own, nor have we the *Gospel of Truth*, which Irenæus attributes to the Valentinians. The *Letters*, *Homilies*, and *Psalms* of Valentinus have likewise perished. Fragments have come down to us from the works of Bardesanes, a Christian poet of Syria (died after 220 A.D.), who is sometimes classed among the Gnostics. In the *Pistis Sophia* we possess an Egyptian Gnostic writing of the third century, preserved in Coptic, relating the history of Wisdom in the form of a dialogue between the risen Christ and His disciples. Here asceticism is put forward as a Christian duty, and we find something closely akin to the sacramental theory of penance. Other valuable Coptic versions of Gnostic works have recently been discovered by Carl Schmidt, including the *Books of Jeu*, the *Gospel of Mary*, and the *Sophia Jesu Christi*. Epiphanius preserves for us a letter from the Valentinian Ptolemy to Flora, and there is also a Naassene hymn. There are several books of Gnostic *Acts*, bearing the names of Peter, John, Thomas, and Andrew, which appear to have been circulated in a collection which passed under the name of one Leucius.

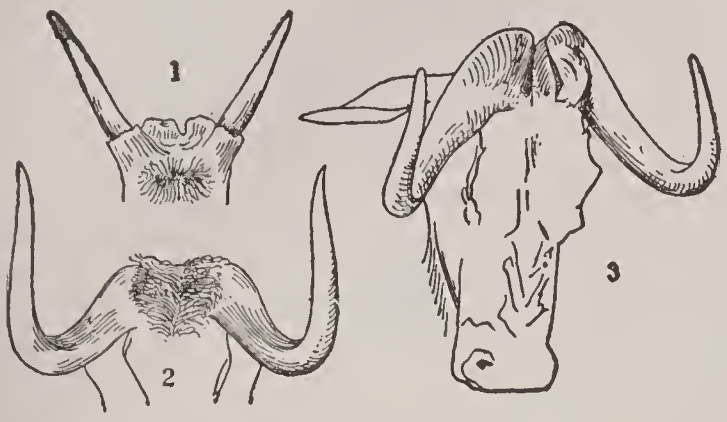
Bibliography. On the literature of Gnosticism, consult: Harnack-Preuschen, *Geschichte der altchristlichen Litteratur* (Leipzig, 1893); Mead, *Pistis Sophia*, translation (London, 1896); King, *The Gnostics and their Remains* (2d ed., ib., 1887); Mansel, *The Gnostic Heresies of the First and Second Centuries* (ib., 1875); Hilgenfeldt, *Ketzergeschichte des Urchristenthums* (Leipzig, 1884); Mead, *Fragments of a Faith Forgotten* (London, 1900); Swiney, *Esoteric Teachings of the Gnostics* (ib., 1909); Bousset, *Hauptprobleme der Gnosis* (Göttingen, 1911); Faye, *Gnostiques et gnosticisme* (Paris, 1913); and especially C. Schmidt, *Coptish-gnostische Schriften* (Leipzig, 1905). The most important attacks upon the Gnostics may be read, in English, in the *Ante-Nicene Fathers*, ed. by Coxe (10 vols., New York, 1885–96). In general, consult: Harnack, *History of Dogma*, vol. i (London, 1894); Rainy, *The Ancient Catholic Church* (New York, 1902); W. Schultz, *Dokumente der Gnosis* (Jena, 1910). See BASILIDES; CARPOCRATES; CERDONIANS; CERINTHUS; DOCETÆ; ENCRATITES; HERACLEON; MARCION; NICOLAITANS; OPHITES; SETHITES; VALENTINIANS.

GNOSTICS, nŏs'tĭks. Those who adhered to the system known as Gnosticism. From the end of the first century onward for two generations Gnostic heretics were many and widely scattered. "A multitude of Gnostics have sprung up and have shown themselves like mushrooms growing out of the ground," says Irenæus. It was formerly customary to distinguish two main types, a Jewish and a Greek, but it is hardly possible to classify them with any exactness. Carpocrates, Saturnilus, Cerdo, Basilides, Valentinus, Isidore, Heracleon, Ptolemy, and Julius Cassianus are among the best-known Gnostic leaders. Saturnilus (or Saturninus, as he is sometimes called) represents the Syrian school, to which Tatian and the ascetic sect of the Encratites are in a measure related. Basilides and Valentinus are the masters of the Alexandrian Gnostics, the school which was by far the most important and about which we have the fullest information. Basilides taught in the time of Hadrian. Valentinus went from Alexandria to Rome, where he labored (c.140–160 A.D.) and founded a church. Marcion of Pontus (q.v.) is sometimes reckoned as a Gnostic and certainly had many points in common with them. See GNOSTICISM, and the articles on the Gnostic teachers and sects.

GNOSUS. See CNOSUS.

GNU, nū (from Hottentot, *gnu*, *nyu*), or WILDEBEEST. A member of a remarkable genus (*Connochetes*) of African antelopes, of which the best-known species has been formerly described as made up of parts of an antelope, a buffalo, and a horse. The grotesque appearance of some species suggests this composite. (See Plate of

Antelopes.) The gnus form a genus of large, ungainly animals, having horns in both sexes and the withers higher than the haunches. The body and legs are antelope-like, but the head is so massive and broad as to resemble that of an ox. The muzzle is naked, the eyes are small, with a gland beneath each, whence sprout long stiff hairs, and the horns, which in old age form a helmet over the forehead, are broad, black, and shaped like an African buffalo's, to which must be added the bovine-like circumstance, not present elsewhere among antelopes, that the horn cores are honeycombed with cavities. Long hairs bristle about the chin and throat, and a stiff mane is borne upon the arched crest of the neck; while the tail is profusely hairy, like that of a horse, and sweeps the ground.



HORNS OF GNU.
Showing development from the yearling (1) through youth (2) to maturity (3) in the white-tailed gnu.

There are two species. The once "common" gnu, or white-tailed wildebeest (*Connochetes gnu*), formerly roamed all over South Africa, but by the end of the nineteenth century had become so scarce as to be extinct except in the remoter districts; its dependence upon water denied it the desert, which has been the means of preserving some of its former associates. In this species long hair fringes the chest, and the color is uniformly deep brown, with the tail white. In the other species, the brindled gnu or blue wildebeest (*Connochetes taurinus*), whose habitat was north of the Zambezi, wherever plains extended, the chest has no long hair, the tail is black, and the general color duller, and marked with dark vertical stripes upon the shoulders and neck. The former stands about 4½ feet high; the latter is somewhat larger. The females of both are lighter in hue than the males.

Gnus went about in bands of 30 or 40 and were fond of associating with quaggas and zebras, whose actions their own resembled. The old bulls were extremely watchful and usually the first to discover danger and give the alarm. Consult Lydekker, *Game Animals of Africa* (London, 1908). See Antelope, and Plate of Antelopes.

GNU GOAT. See Takin.

GOA, gō′ȧ. A Portuguese colony on the Malabar coast, India, extending from lat. 14° 53′ to 15° 48′ N. and from long. 73° 45′ to 74° 24′ E. (Map: India, B 6). It is 60 miles long by 30 miles broad and contains an area of 1301 square miles. It has been a Portuguese possession since its conquest by Albuquerque in 1510. Pop., 1900, 475,513. Capital, Panjim, or New Goa. (See following article.)

GOA. A city on the Malabar coast, India, in lat. 15° 30′ N. and long. 73° 57′ E., the former capital of the Portuguese dominions in India (Map: India, B 6). It was once a city of great magnificence, with 200,000 inhabitants, and important chiefly on account of its harbor, one of the best on the west coast. Its decline was due to the ravages of cholera in the beginning of the eighteenth century, when most of the Portuguese left the former site and settled nearer the harbor of Panjim, or New Goa, which is the present seat of the colony. Pop., 1900 (old town), 2302; (new town), 9325. The old city is the see of an archbishop, the head of Roman Catholicism in India, and contains the imposing cathedral of St. Catharine, built in 1623, and the church of Boni Jesus, besides many interesting ruins. Panjim, on the Mandavi River and connected by the Portuguese West India Railway with British India, is a clean and picturesque town, with a good modern harbor, large barracks, viceregal palace, college, and public library. It has large salt works near by. Rice, coconuts, and spices constitute the chief products and exports. For a description of ancient Goa, consult: Marryat, *Phantom Ship* (London, 1839); B. H. Baden-Powell, *The Villages of Goa in the Early Sixteenth Century* (ib., 1900); Henry Bruce, *Letters from Malabar and on the Way* (New York, 1909).

GOA. A gazelle (*Gazella picticaudata*), inhabiting the highest pastures of the Tibetan plateau, and having a very heavy coat of hair in adaptation to its cold habitat.

GOA CEDAR. See Cypress.

GOAJIRA, gō′ä-ʜē′rȧ. A peninsula of South America, lying west of the Gulf of Venezuela, forming the most northern part of the continent. Its area is estimated at over 5000 square miles (Map: Colombia, C 1). The coasts are mostly sandy and low, while the interior contains a number of mountains. It is sparsely watered, and the chief occupation of the inhabitants is cattle breeding. Its people are semi-independent Indians, known under the name of Goajiros, and variously estimated at from 30,000 to twice that number. The peninsula was formerly divided between Venezuela and Colombia, but by the decision of 1891 it was awarded to the latter.

GOAJIROS, gō′ȧ-ʜē′rōs. An Arawakan tribe of the Goajira Peninsula, on the northwest of Lake Maracaibo, South America. This most interesting tribe build their houses in the Maracaibo and other lagoons of Venezuela, driving piles into the mud, and erecting on them oblong rectangular dwellings with high-pitched roofs. The structures are thatched and have on one or more sides platforms on which cooking and the family occupations are carried on in open air, and which also serve as landing places for canoes. The name "Venezuela," or "little Venice," originated from the prevalence of these structures over the water. The people subsist by fishing, agriculture, and on the natural fruits, nuts, and roots of this bountiful region. They are expert in weaving cotton and palm textiles and make beautiful featherwork. Consult I. F. Holton, *New Granada: Twenty Months in the Andes* (New York, 1857).

GOA POWDER, Araroba, or Chrysarobin. A drug imported in the form of a yellowish or chocolate-colored powder. The name "Goa powder" is derived from the Portuguese colony of Goa, where the drug appears to have been introduced about the year 1852. It was exported from Bahía to Portugal, whence it found its way to the Portuguese colonies in Africa and Asia. The tree which yields it (*Andira araroba*) is met with in great abundance in certain forests in the Province of Bahía, Brazil, preferring low and humid spots. It is from 80 to 100 feet high and is furnished with imparippinate leaves, the leaflets of which are oblong, about 1½ inches long and ¾ of an inch broad, and somewhat truncate at the apex. The flowers are papilionaceous, of purple color, and arranged in panicles. The Goa powder, or araroba, is contained in the trunk, filling crevices in the heartwood. To obtain it the oldest trees are selected as containing the larger quantity, and after being cut down are sawed transversely into logs, which are split longitudinally, and the araroba chipped or scraped off with the axe. During this process the workmen feel a bitter taste in the mouth, and great care has to be taken to prevent injury from the irritating action of the powder on the eyes. In this state, i.e., mixed with fragments of wood, the Goa powder is exported. Somewhat purified, as chrysarobin, it is used in the form of an ointment made by rubbing together 40 grains of the powder, 10 drops of acetic acid, and an ounce of lard. It is used in several skin diseases, especially in ringworm and psoriasis; and it owes its efficiency to the chrysophanic acid it contains.

GOAR, gō′är′, SAINT (c.585–649). A mediæval missionary, born in Aquitaine. According to the legends concerning him, he went (c.618) to Oberwesel, Germany, where he erected a chapel at what is now St. Goar and made numerous converts. He was buried in the chapel, and the monastery subsequently erected there became a chapter house in 1127. In 1768 the celebrated church of St. Goar on the Rhine was dedicated to him. His fête is July 6.

GOAT (AS. *gāt*, Icel. *geit*, OHG. *geiz*, Ger. *Geiss;* ultimately connected with Lat. *hædus*, kid). A genus (*Capra*) of ruminant quadrupeds of the family Bovidæ, so closely allied to the sheep that it is not easy exactly to define the distinction, although the common domestic goat and sheep are of widely different appearance. One of the most marked of the distinguishing characters is that the horns of goats, present in both sexes, but smaller in the females, are long and directed upward, backward, and outward, while those of the sheep are more or less spirally twisted. Other characteristics are the beard on the chin of the male goats, which is wanting in the sheep, and the straight line of the face in goats, as compared with the arched line in sheep. The tail of goats is also much shorter than that of sheep. A constant mark of distinction is the absence in goats of a small pit between the toes of the hind feet (in some cases of all four feet), producing a fatty secretion, which exists in sheep and is peculiar to them. And another constant mark which is absent in sheep is the strong smell of male goats, particularly during the rutting season. Equally constant are the differences of temper and manners, goats being in a high degree curious and confident.

WILD GOATS

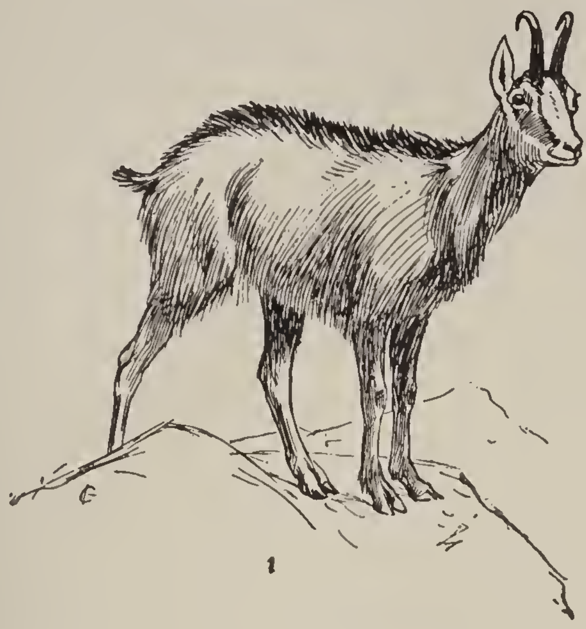
True wild goats, of which some 10 species are recognized, belong to the Old World alone, where they are confined to the mountainous region which extends from the Atlas ranges of northwestern Africa to Central Asia. Some other animals called goats are zoölogically otherwise related. All are essentially mountain animals and exhibit a great aptitude for scrambling among rocks and bushes, are extremely surefooted, and display great strength and agility in leaping. They also prefer as food the leaves and small branches of shrubs, and the strongly aromatic herbs which abound in mountainous localities, to the herbage of the richest pastures, browsing rather than grazing, as do sheep. They live in small herds, but the old bucks are likely to live separately, and thus serve the purpose of scouts, though all are extremely wary and hence are among the most difficult of game for the sportsman. Two kids are usually produced at birth, in late spring, and very quickly become able to travel with the band.

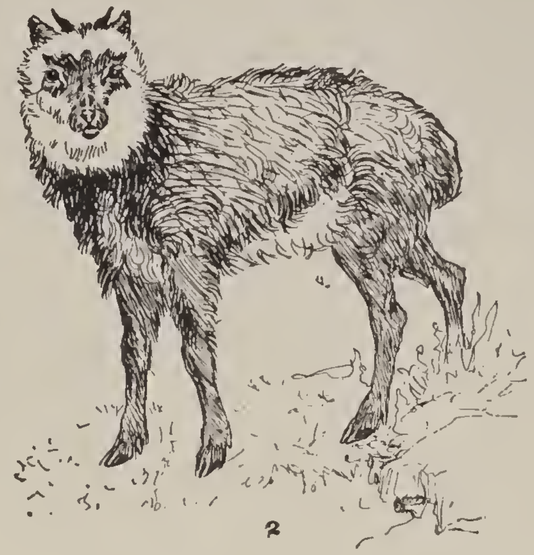
The best-known as well as most characteristic species of wild goat is the bezoar goat, or pasang (*Capra ægagrus*), which was once common throughout the Grecian Archipelago, but now is known only in Crete and one or two other islands and thence eastward through the highlands of Asia Minor to Persia and thence to northeastern India. It inhabits all barren hills in the East, but in Persia rarely descends much below the timber line. This goat (see Plate of WILD GOATS, ETC.) stands about 36 inches high and in winter is brownish gray, changing in summer to a more reddish-yellow tint, with the buttocks and underparts nearly white; and the older bucks have the forehead, chin, beard, throat, front of the legs, a stripe along the spine, the tail, and a band of the flanks dark brown. The horns of the old bucks measure 40 to 50 inches along the curve, rise close together from the top of the skull, and sweep backward in an even curve, with the front edge forming a strong keel marked by irregular prominences; the horns of the female are much smaller and smoother. The old bucks maintain a most vigilant watch, one or more being constantly on the lookout and warning the herd of danger. This is the species from which domestic goats have been derived. An illustrated account of this species will be found in the *Proceedings of the Zoölogical Society of London for 1875*, by C. G. Danford.

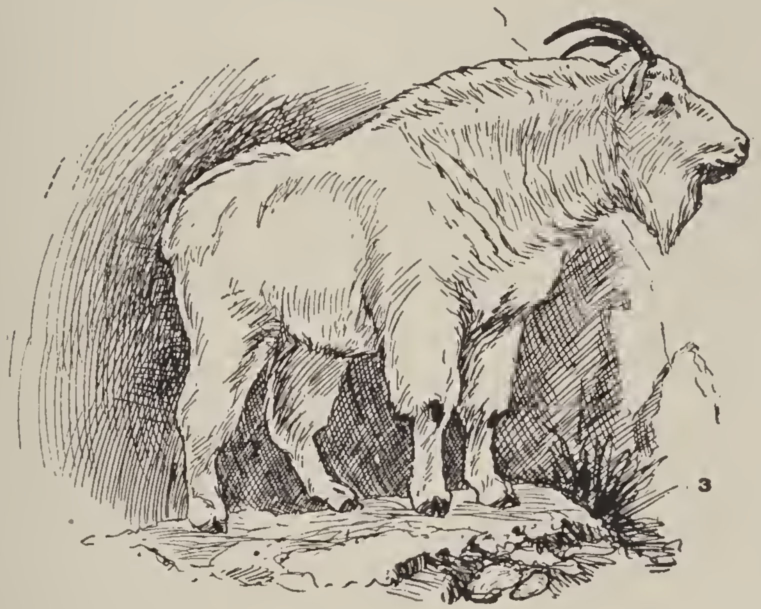
Goats of the Caucasus, or Turs. Three kinds of wild goats, distinguished as species, but perhaps only varieties of a single race, inhabit the Caucasus Range, which in form and color much resemble the pasang, though somewhat paler as a rule, and with long reddish-brown beard and short scut. Their horns, however, are very different, being very massive, smooth, and black, with a squarish cross section at the base, and sweeping outward and then inward, with a tendency towards a spiral, best shown in the Western, or Severtzow's, tur (see Plate of WILD GOATS, ETC.), which more nearly approach the form of the ibex's. The eastern Caucasus is inhabited by Pallas's tur (*Capra cylindricornis*); the central parts of the range, between Mount Elburz and Daghestan, by the Caucasian tur (*Capra caucasica*); and the western part by the larger, more ibex-like Severtzow's tur (*Capra severtzowi*).

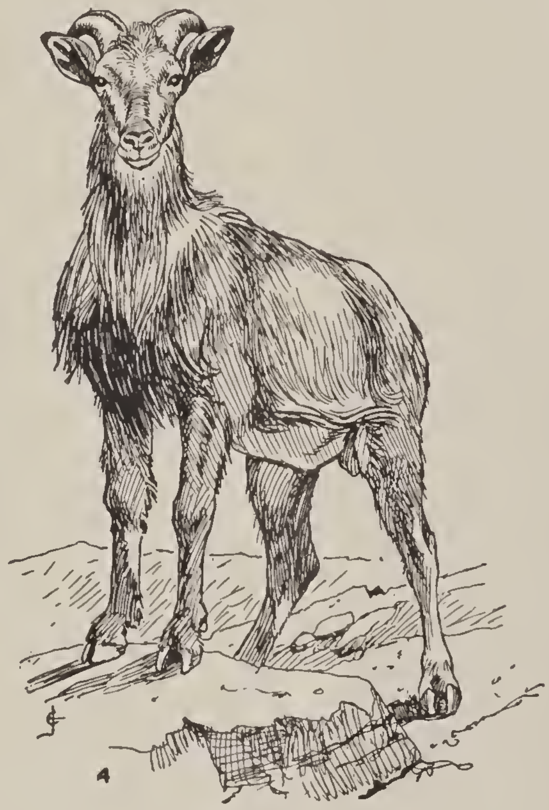
The Spanish Goat. Closely allied to the turs is the wild goat, or "cabramontes" (*Capra pyrenaica*), of the mountains of Spain and Portugal. It is a smaller animal than the others, bucks standing about 26 inches in height, with horns measuring 25 to 28 inches in length. Its horns are divergent, tend to be spiral, are somewhat triangular in section, with a strong keel on their posterior border, and knobs along the outside. These goats are so wary and resourceful that they remain numerous.

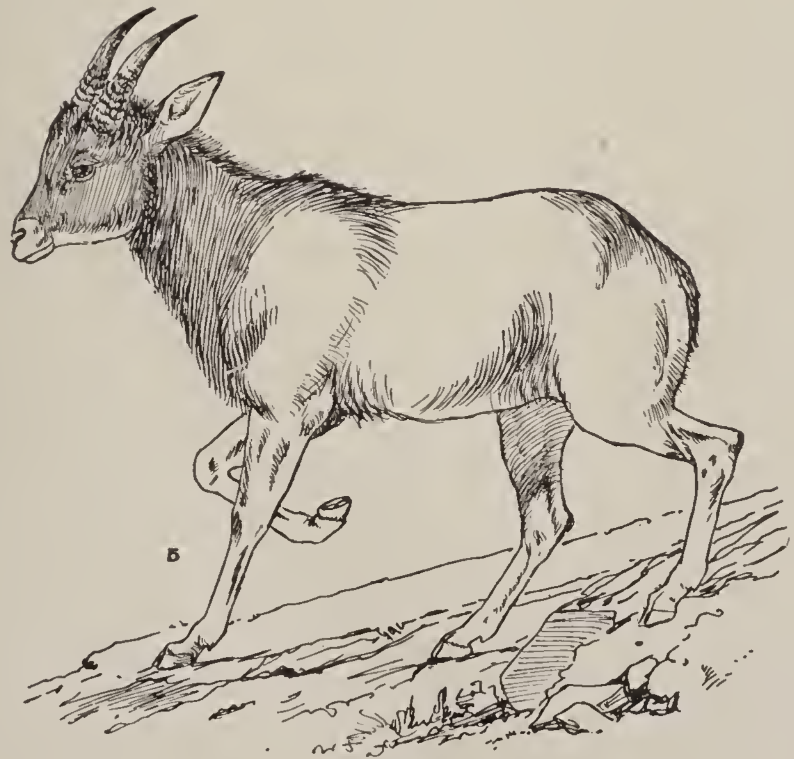
GOAT-ANTELOPES

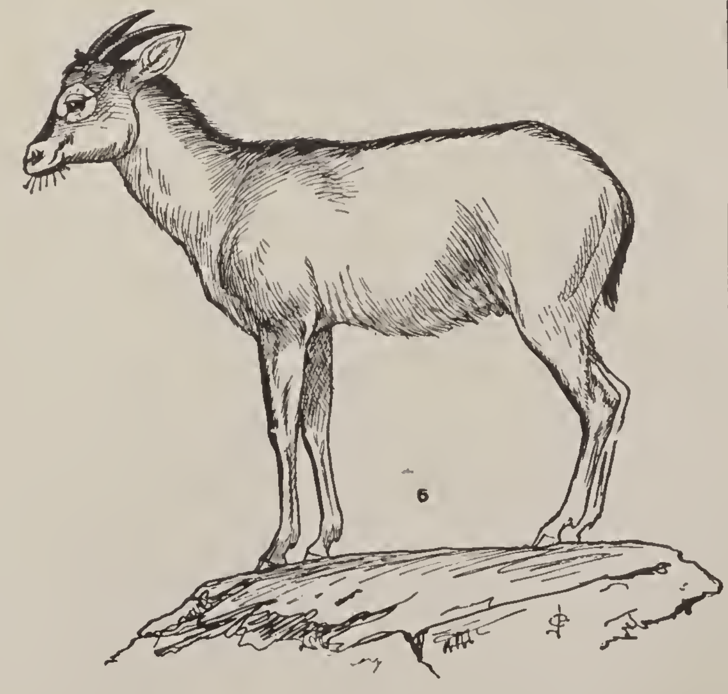












1. EUROPEAN CHAMOIS (Rupicapra rupicapra).
2. JAPANESE SEROW (Nemorhœdus crispus).
3. WHITE GOAT of Rocky Mountains (Oreamnus montanus).
4. TAHR or HIMALAYAN GOAT (Hemitragus jemlicus).
5. HIMALAYAN SEROW (Nemorhœdus bubalinus).
6. HIMALAYAN GORAL (Cemas goral).

Ibex. All wild goats are frequently spoken of as ibexes, but the term should properly be restricted to four species of *Capra* dwelling upon the higher mountains of southeastern Europe, Syria, Arabia, Abyssinia, and in the Himalayan region. They have long, knobbed, scimitar-like horns. See IBEX.

The Markhor. This is a large wild goat (*Capra falconeri*) of the western Himalayas, distinguished by its high, upward-reaching, flattened and spirally twisted horns. (See Plate of WILD GOATS, ETC.) It is found from central Afghanistan to the sources of the Indus, and in this area exhibits several well-marked local races, in some of which the horns are much less twisted than in others, the longest measuring (along the curve) 50 inches. Its habitat ranges from barren foothills to the edge of the snow and includes much rocky forest land; the country, therefore, is always an exceedingly difficult one to hunt in, besides which the animals are wonderfully keen and watchful. Nevertheless, kids are captured from time to time and are found to thrive well in captivity and to interbreed with domestic goats. The markhor is larger than other goats and is distinguished by the great black beard of the old bucks, which covers the whole throat and breast with a mat of long hair, which also forms a heavy ruff around the shoulders. The remains of a goat closely resembling the markhor have been found in the Pliocene strata of India.

Tahrs and Goat Antelopes. There exist in southern Asia three species of goat which have no beards and small horns and are assigned to a separate genus, *Hemitragus*, the tahrs; one is known to Anglo-Indian sportsmen as "Nilgiri goat." For an account of this genus, see TAHR.

Intermediate between the goats and the antelopes stand several genera and species of mountain-loving animals, including the goral, cambingutan, serows, takin, chamois, and the American white goat. For these, see their names and GOAT ANTELOPE.

Bibliography. Lydekker, *Royal Natural History*, vol. ii (London, 1896); Blanford, *Fauna of India: Mammals* (ib., 1888–89); id., *Eastern Persia: Zoölogy* (ib., 1876); Danford, "Notes on the Wild Goat," in *Proceedings of the Zoölogical Society of London* (ib., 1875); Lydekker, *Wild Oxen, Sheep, and Goats* (ib., 1898). Consult also the writings of sportsmen in India and Central Asia.

DOMESTIC GOATS

It is probable that the native Asiatic goats were among the first animals brought under the subjection of man, and there is no doubt that the main stock of those now in domestication was derived from the Persian pasang (see above). They must have been of peculiar value to the early nomadic men of southeastern Asia, since they could pasture on the scanty herbage and bushes of the rocky mountains and plateaus and move anywhere their masters went with even greater facility—conditions which domestic sheep could not well endure.

The varieties of the domestic goat are too many for treatment here, where only the most important can be mentioned. Those of Europe present many diversities of coat and form of horns, and distinguishable breeds are found in Ireland, Wales, and Norway; but no kind has the pendulous ears frequently seen in Asia, except a cream-colored breed peculiar to the island of Malta, whose ears hang below the jaw. This goat and some Spanish breeds are frequently hornless. More distinctive breeds exist south and east of the Mediterranean. Thus, the "guinea" goats, kept in enormous flocks by the natives of the Sudan and of the Niger valley, are rather small, short-legged, short-haired, and usually dark in color, black and red prevailing. The horns are only 3 or 4 inches long and curve forward at their tips; and the black beard is continued downward to spread over the shoulders and forelegs, suggesting some possible ancestral cross with the aoudad (q.v.). The Nile valley and Egypt have a different goat, in which the legs and horns are longer; the profile is very convex, the horns crumpled, and often absent, and there is no beard. The short coat is usually reddish or bluish gray, more or less spotted, and the pendent ears are about as long as the head, flat, and round at the ends. The goats of Syria, Turkey, and southwestern Asia, on the other hand, are large and tall, with the hair long, black, and silky, prominent curving horns, a small beard in both sexes, and the ears hanging for half their length below the jaw. These are sometimes called mamber, or Kurd, goats, and are the common stock of the country. In Asia Minor, however, there has existed, from immemorial times, a remarkable breed known as mohair, or Angora, goats, which merit particular description, since lately they have been sedulously cultivated in various other countries, including South Africa and the United States.

The Angora Goat. Various types of Angora goats have arisen in Asia Minor and Turkey during the last half century, owing to unwise crossing with the common Kurd stock. The pure-bred Angora was originally a small, exceedingly delicate animal, with small thin horns, suggesting by their spiral form descent from the wild markhor. It was clothed with "dazzling white, fine, soft, silky, very lustrous mohair, curling in ringlets from 10 to 18 inches long." The continual crossing and recrossing it has undergone has resulted in an animal much larger and more hardy. The type now approved in the United States (see Plate of WILD GOATS) is strongly built, with a straight horizontal back, short and strong legs, the head like that of a common goat, but less coarse, and the horns heavy, with an inward twist. "Except the face and legs, from the hocks and knees down, the entire animal should be covered with mohair. Both the belly and throat and even the lower part of the jaws should have a covering of fine, silky mohair in long, curly ringlets." These goats were introduced into the United States by a gift of nine from the Sultan of Turkey in 1849. Little increase followed, and all disappeared during the Civil War. Other importations were occasionally made until 1881, when the Sultan prohibited any exportation of the animals. Several were, nevertheless, obtained for California breeders in 1901. Angoras were scattered through the Southern States, but their raising and keeping did not become an industry until recently, when large flocks were produced on the Pacific coast, especially in Oregon, and they have been successfully introduced in Iowa and Missouri. So promising have been these experiments that an extensive culture of this breed all over the United States, as well as in southern South America, is expected; and two clubs for the encouragement of the industry and the registry of blooded stock have been organized. It is claimed for the Angora goats that they are among the most useful of domestic animals in a variety of ways. "The fleece, called mohair (q.v.), furnishes some of the finest of fabrics among ladies' goods and is used in various other manufactures; their habit of browsing enables the farmer in a wooded locality to use them to help in subjugating the forest; their flesh is exceedingly delicate and nutritious; the milk, though not so abundant as with the milch breed of goats, is richer than cow's milk; their tanned skins, though inferior in quality to the skins of the common goat, are used for leather; their pelts make the neatest of rugs and robes; they are excellent pets for children; a few of them in a flock of sheep are a protection from wolves and dogs; their manure is noticeably helpful to the grass, which follows them after they have cleaned away the underbrush." A pamphlet was issued by the United States Department of Agriculture in 1901, containing an account, with illustrations, of the breed, and its qualities and products, and full directions as to feeding, care, shearing, etc. See *Bibliography.*

Goats otherwise have never taken a serious place in the farm property of the United States. The latest agricultural statistics enumerate only 45,500 in the whole country—a number exceeded by such small countries as Cape Verde Islands and Senegal. The great bulk of the goats in the world, estimated at 36,000,000 in 1893, and 32,000,000 in 1896, are to be found in the south of Europe, in Syria, and in northern Africa. All the rest of the world together possesses scarcely a fifth of the total, and goats are almost absent from English-speaking countries the world over. The ordinary domestic goat is highly prized in oriental and tropical countries for its milk and its flesh which differs but little from that of sheep. The skins form an important article of commerce, the value of the goat skins imported into the United States ranging from $20,000,000 to $25,000,000 per annum and coming from China, Southern Russia, South America, and Mexico.

The Cashmere or Shawl Goat. Nowhere have goats, other than Angoras, received more attention or been brought to a higher usefulness than in India, where a long list of varieties might be named and described, such as the streaked "naga" of Assam, the "bukee" of the Deccan, the "maycay" of Mysore, etc. None of these equal in importance, however, those of the western Himalayan region, which are cultivated for the sake of their wool, of which the genuine Cashmere shawls are made. Two principal varieties of these are distinguished—the lesser, or chappoo, and the more common *changra,* or "shawl goat." This variety is rather small, of various colors, but generally silvery white, with long, flattened, spiral horns, and pendent ears. These goats are valued, not for the long outer hair, but for the underwool, or *pashm,* which in summer is combed out and appears like grayish down. It is beautifully fine, soft, and silky, and from it are made the famous and often extremely costly shawls of Kashmir and its neighborhood. These goats were introduced into France and Germany during the last years of the nineteenth century and have thriven well. Their natural home extends through Tibet through the mountains southwestward to the country of the Kirghiz, and enormous flocks are pastured by the natives in the high Himalayan valleys.

For the "Rocky Mountain goat," see Rocky Mountain White Goat.

Bibliography. Pegler, *The Book of the Goat* (4th ed., London, 1909); Schreiner, *The Angora Goat* [in South Africa] (London, 1898); Thompson, "The Angora Goat," in *United States Department of Agriculture, Farmers' Bulletin No. 137* (Washington, 1901); Robertson Scott, *The Case for the Goat* (New York, 1908).

GOAT ANTELOPE. A term applied by zoölogists to a group of ruminants having characteristics that join them to the goats on one side and the antelopes on the other; most of them, individually described elsewhere, have a more or less goatlike build, goatlike teeth, short tails, relatively small cylindrical horns, and no beards. The group includes the genus *Cemas* of the Himalayan region (see Goral); the genus *Nemorhædus* of southeastern Asia, including the cambing-utan of Sumatra, etc. (see Serow); the Tibetan genus *Budorcas* (see Takin); the genus *Rupicapra* of the European Alps (see Chamois); and the genus *Oreamnus,* or *Haploceros,* which contains the white, woolly goats of northwestern America (see Rocky Mountain White Goat). See Plate of Goat Antelopes.

GOAT'FISH', or Salmonete. A marine fish of the genus *Upeneus,* closely related to the surmullets, many species of which exist in tropical American waters and are used as food as well as admired for their gaudy beauty. The red goatfish is *Upeneus maculatus;* the yellow is *Upeneus martinicus.* Both are common at Key West, Fla., and in the West Indies.

GOAT ISLAND. An islet roughly oblong in shape, a little more than ½ a mile long and somewhat less than ¼ of a mile in average width, which divides the two great cataracts forming the Niagara Falls (q.v.). A bridge connects it with the American shore.

GOAT LOUSE. A biting louse of one or more species of the genus *Trichodectes,* parasitic in the hair of goats. Several species are known in various parts of the world, most widely *Trichodectes climax.* The species commonly troublesome on the Angora, or mohair, goats is regarded by some entomologists as peculiar to that animal and is named *Trichodectes limbatus.* Consult Osborn, "Insects Affecting Domestic Animals," in *United States Department of Agriculture, Division of Entomology, Bulletin 5* (Washington, 1897).

GOAT MOTH. One of the largest of European moths (*Cossus ligniperda*), measuring 3 to 3½ inches across the expanded wings, and brown, with various streaks and mottlings. In Great Britain the long, flat, hairy, yellowish caterpillar is called the auger worm, and wanders about in search of some suitable tree into which to bore a tunnel. It feeds upon the excavated wood more than three years, then spins at the extremity of the tunnel a very tough cocoon formed of wood chips glued together by a gummy secretion, in which a small aperture is left for the admission of air. The adults have no proboscis, take no food, are very short-lived, and take their name from the goatlike odor they exhale. Congeneric species dwell in the United States.

GOATSBEARD. See Salsify; also Spiræa.

GOAT'S-RUE. See Rest-Harrow.

GOAT'SUCK'ER. The common European nightjar (*Caprimulgus europæus*), known anciently as "caprimulgus" in Italy and "aigothelas" in Greece, representative of a large cosmopolitan family of wide-gaped, nocturnal, moth-catching birds, the Caprimulgidæ. The name is due to an immemorial popular belief that this bird milks goats. The notion probably arose from the habit of these birds of seeking insects, usually at dusk and near the ground, in pastures with domestic animals. Their strange leaping motions and great mouths would easily lend themselves to the construction of such a tale among primitive folk. See NIGHTJAR.

GOBAT, gô'bȧ' (CHARLES), ALBERT (1843–1914). A Swiss Parliamentarian, born at Tramelan, Canton Bern. He practiced law at Deleinont from 1868 to 1882, when he was elected as a radical to the Great Council of Bern. In 1884 he became a member of the Federal Council of States, and in 1890 of the National Council. He became noted as an advocate of international peace and in 1902 received the Nobel prize (with Ducommun). He wrote a popular history of Switzerland (1900) and *Croquis et impressions d'Amérique* (1904). In 1907 he became head of the International Bureau of Peace in Bern.

GOBAT, gô-bä', SAMUEL (1799–1879). An English missionary, born at Crémine in Switzerland. In 1826, after studying at the Mission House in Basel, and learning Arabic, Ethiopic, and Amharic, he started as a missionary of the English Church Missionary Society to Abyssinia. Until 1829 he and his companion, Christian Kugler, got no farther than Cairo. Then they went to Gondar and met with much success. But in 1832, after Kugler's death and the beginning of hostilities, Gobat left the country. In 1839 he went to Malta, worked on the Arabic Bible, had charge of the presses there, and in 1845 was director of the Protestant College. A year afterward he was appointed (joint Anglican and Lutheran) Bishop of Jerusalem. There he did a great work, especially in his orphan schools and in the hospitals. His experiences in Abyssinia are described in *A Journal of a Three Years' Residence in Abyssinia* (2d ed., 1847; in French in Paris, 1834). Consult Schoelby, *Samuel Gobat, evangelischer Bischof in Jerusalem* (Basel, 1900), and Madame Roerich's biography (Paris, 1880; in German, Basel, 1884; in English, with preface by Shaftesbury, London, 1884).

GOB'BO, IL. See SOLARI, CRISTOFORO.

GOBBO, LAUNCELOT. A quaint, shrewd clown, in Shakespeare's *Merchant of Venice,* at first a servant to Shylock, whom he afterward deserts for Bassanio.

GOBELIN, gô'blăɴ'. Any tapestry woven at the Gobelins, Faubourg Saint-Marcel, Paris, where the industry was established in 1601. (See TAPESTRY.) The origin of the name is shown by the inscription in French at the entrance gateway: "Jean and Philibert Gobelin, merchant dyers of scarlet, who left their name to this quarter of Paris and to the tapestry factory, had their works here at the end of the fifteenth century." The family prospered and from dyers finally became financiers, two of them at the end of the sixteenth century acting as first presidents of the Chamber of Accounts, and a third later acquiring the title of Marquis of Brinvilliers. Dyeing being beneath their dignity, they were glad to dispose of the property. The name, however, remained and became so closely identified with the tapestry industry established by Comans and Planche on the invitation of Henry IV, that in Germany gobelin still is, and elsewhere for a time was, the name of any picture tapestry, even one woven long before 1440, when Jean Gobelin moved from Rheims to Paris. Consult: Guiffrey, *Les Gobelins et Beauvais* (Paris, 1906); Fenaille, *L'Etat général des tapisseries de la manufacture des Gobelins depuis son origine jusqu'a nos jours* (5 vols., ib., 1903–12); Hunter, *Tapestries* (New York, 1912). See EMBROIDERY.

GOBE-MOUCHE, gôb-mo͞osh' (Fr., gaping mouth). Originally the name of a certain species of birds termed flycatchers. In its transferred use it refers to a silly or credulous person who has no opinion of his own or to one who is generally idle.

GOBI, gō'bē, or **SHAMO,** shä'mō'. A vast desert region of Central Asia, constituting the eastern extension of the arid belt that stretches across the whole breadth of the Asiatic continent into Africa (Map: Asia, L 4). As generally defined, it includes only the desert area of Mongolia from the confines of Sinkiang on the west to the Khingan Mountains on the east, although some geographers extend its western limits to Lob Nor, in about long. 90° E. East of the Khingan Range is a smaller arid region, commonly called the Eastern Gobi. The Gobi has the form of a great plateau, whose surface, lying 3000 feet or more above the sea, is divided into dreary wastes of sand, rocky table-lands, and mountains. The climate is severe, especially on the borders, and the rainfall scanty; the precipitation being generally sufficient, however, to furnish pasturage for flocks and herds during the summer months. Most of the nomadic tribes inhabiting the interior are Buddhists. The permanent settlements are confined to the northern part, which is traversed by spurs of the Tian-Shan, Altai, and Yablonoi mountains. A number of caravan routes lead across the desert from China proper to Siberia. Some allusions to the Gobi Desert are found in the writings of Marco Polo, but the first definite information we owe to the Jesuit Gerbillon, who made several journeys across the country in 1688–98. It was later visited by the Dutchman Ysbrand Ides, in 1692–94, and twice (1727–28 and 1736) by Lorenz Lange, who was sent by the Russian government to Peking. The most accurate and valuable information about the desert was obtained by explorers in the last 50 years, especially by Przhevalski and Sven Hedin (qq.v.).

GOBINEAU, gô'bē'nô', JOSEPH ARTHUR, COUNT OF (1816–82). A French Orientalist, born at Ville-d'Avray, near Paris. He held various diplomatic positions in Europe and represented France at Athens, at Rio de Janeiro (1868), and Stockholm (1872–77). His works include: *Trois ans en Asie* (1859); *Les religions et les philosophies de l'Asie centrale* (1865; 3d ed., Paris, 1900); *Traité des inscriptions cunéiformes* (2 vols., 1864); *Histoire des Perses* (2 vols., 1869); *Histoire d'Ottar Jarl, pirate norvégien* (1879); *Essai sur l'inégalité des races humaines* (4 vols., Paris, 1853–55), translated into English under the title *Moral and Intellectual Diversity of Races* (Philadelphia, 1856) and into German by Schemann (Stuttgart, 1898–1901); and *Pages choisies,* a volume of selections edited by Morland (Paris, 1905), in which can be found a brief biography (pp. 5–45). Consult: Kretzer, *Gobineau* (Leipzig, 1902); Seillière, *Le comte de Gobineau et l'aryanisme historique* (Paris, 1903); Kleinecke, *Gobineaus Rassenphilosophie* (Berlin, 1902).

GOBLET, René (1828–1905). A French statesman. He was born at Aire-sur-la-Lys, studied law, and practiced with great success at Amiens. Already distinguished for his democratic principles expressed in his paper, the *Progrès de la Somme*, at the fall of the Empire he became procureur général at the court of Amiens. In 1871 he was elected to the National Assembly, where he joined the Republican Left and was soon recognized as an orator of rare ability. In 1876 he failed of reëlection to the Chamber, but was successful in 1877 and 1881. In 1879 he was appointed Undersecretary of State for Justice, and in 1882 was appointed Minister of the Interior in the Freycinet cabinet, but in the crisis brought about by the Egyptian question and because of the attacks made upon the ministry of Freycinet, he, with the other members, resigned. Goblet was appointed Minister of Education and Public Worship in the Brisson ministry (April, 1885) and energetically continued his reform policy. He retained his portfolio in the Freycinet cabinet, which went out of office in December, 1886, when he became Prime Minister. His ministry was overthrown in May, 1887, because of his unpopular efforts towards radical change in the municipal organization of Paris and because he was weak in the Schnaebele affair with Germany. He had been much embarrassed besides by his Minister of War, Boulanger. From April, 1888, to February, 1889, he held the portfolio of Foreign Affairs in the Floquet cabinet. He was elected senator in 1891, and as such warmly supported anticlerical measures and, together with Lockroy, Sarrien, and Peytral, drew up a political programme of action of which the *Petite République Française* is the organ. From 1893 to 1898 he was again a member of the Chamber of Deputies, where he voted with the Radicals. In 1902 he protested against Combes's action in closing schools conducted by the religious orders.

GOBLET D'ALVIELLA, gō̆'blȧ' dȧl-vyĕl'lȧ, Albert Joseph, Count (1790–1873). A Belgian general, born at Tournai. He served in the French army in 1811–14 and then in the Dutch, and was Minister of War after the revolution of 1830, which post he exchanged in 1832 for the Ministry of Foreign Affairs. From 1837 to 1839 he was Ambassador to Portugal and was adviser to the young Queen, Maria da Gloria, from whom he received the title of Count d'Alviella. In 1839, returning to Brussels, he became Minister without portfolio, was again Minister of Foreign Affairs from 1843 to 1845, and exercised a considerable influence upon the public measures advocated in the Chamber. As a military engineer, he planned the defenses of northern Belgium and the extension of the fortifications of Antwerp. His principal publications are *Des cinq grandes puissances de l'Europe dans leurs rapports politiques et militaires avec la Belgique* (1863) and *Dix-huit mois de politique* (2 vols., 1865). Consult the biographical sketch by Juste in *Les fondateurs de la monarchie belge*, vol. viii (Brussels, 1870).

GOBLET D'ALVIELLA, Eugène, Count (1846–). A Belgian historian of religion, grandson of Albert Joseph. He was a member of the Chamber of Deputies in 1874–78 and of the Senate in 1892–94 and after 1900. He became in 1894 professor of the history of religion at the University of Brussels. In 1875 he accompanied the Prince of Wales (later Edward VII) on the latter's journey to India. He also became a collaborator on the *Revue de Belgique*. In addition to descriptions of travel, *Sahara et Laponie* (Eng. trans., "Sahara and Lapland," 1874), *Inde et Himalaya*, and several other works, he published notably: *L'Evolution religieuse contemporaine chez les Anglais, les Américains et les Hindous* (1884; Eng. trans. by Moden, "The Contemporary Evolution of Religious Thought in England, America, and India," 1885); *La migration des Symboles* (1891; Eng. trans., "The Migration of Symbols," by Sir George Birdwood, 1894), his most important volume, whose thesis is that "the religious symbols common to the different historical races of mankind have not originated independently among them, but have for the most part been carried from one to the other in the course of their migrations, conquests, and commerce"; the (Hibbert) *Lectures on the Origin and Growth of the Conception of God as Illustrated by Anthropology and History* (1892); *Ce que l'Inde doit à la Grèce* (1897); *Croyances, rites, institutions* (3 vols., 1911). He made the study of symbols a recognizedly valuable branch of archæology.

GOB'LINS (OF. *gobelin*, from ML. *cobalus*, Gk. *κόβαλος*, *kobalos*, rascal). Spirits of popular superstition, grotesque in appearance, and generally malicious, who live in woods or caves and often lurk about houses. They are called hobgoblins, perhaps a corruption of hopgoblin. See Demon.

GOBLINS, The. A sparkling comedy, interspersed with songs and music, by Sir John Suckling, first acted at Blackfriars in 1638 and revived at the Theatre Royal, Jan. 24, 1667.

GOBO'NY. A term in heraldry. See Componé.

GOB'SECK. A novel by Balzac (1830).

GO'BY (from Lat. *gobio*, *gobius*, gudgeon, from Gk. *κωβιός*, *kōbios*, gudgeon). A spiny-rayed fish of the family Gobeidæ, whose ventral fins are completely united into a disk more or less capable of being used as a sucker, enabling the fish to cling to rocks and so resist the power of waves and currents. They have no air bladder. The true gobies are generally small fishes, some of them inhabiting the shallow bays of the coast, and others deeper water; the species are very numerous and belong to both hemispheres. One species (of Russia) inhabits fresh water alone. The gobies are very interesting, on account of their habits, and are of the number of nest-building fishes, employing seaweeds and eel grass for this purpose in spring. When the female has deposited her eggs in the nest, the male watches over them till they are hatched. In Europe, consequently, these fishes are much in request for aquaria, of which they are among the most interesting occupants. A British species (*Gobius minutus*), which ascends rivers, chooses a cockleshell for its home in some tidal pool. "The shell being placed on the sand with its concave surface downward, the sand beneath it is hollowed out and cemented by a special mucilaginous secretion from the skin; a cylindrical tunnel gives access to the nest, and the whole structure is covered over with loose sand." The female having glued her eggs to the shell, the male guards them for six to nine days, until they hatch. Another European goby (*Latrunculus pellucidus*), which is nearly transparent, is remarkable for being perhaps the most short-lived of all vertebrates, being born in midsummer, maturing during the following winter, and spawning and dying upon the approach of summer, so that none live more than a year. Small species of several genera inhabit the coast and estuaries of the southern United States and of California. See MUDFISH.

GOCH, gȯG, JOHANNES VON (properly JOHANN PUPPER, or CAPUPPER) (c.1400–75). A German Augustinian monk. He was born at Goch, Prussia, studied at Cologne and probably at Paris, and was the founder (1459) of an Order of Canonesses at Tabor, near Mechlin, Flanders, of which he subsequently became prior. A precursor of the Reformation, in his writings, *De Libertate Christiana, De Quatuor Erroribus circa Legem Evangelicam exortis*, and *Epistola Apologetica* (1521), he attacks the influence of Pelagianism in the Church, and advocates a return to the text of the Bible as the only true source of religious truth. He was considered a man of profound piety, and as a theologian was unexcelled in his day. Consult Clemen, *Johann Pupper von Goch* (Leipzig, 1896).

GÖCKINGK, gẽ′kĭṉk (also spelled GOEKINGK and GÖKINGK), LEOPOLD FRIEDRICH GÜNTHER VON (1748–1828). A German poet. He was born at Gröningen and was educated at Halle. After occupying various official positions under the government at Magdeburg, Wernigerode, and Berlin, and acting for several years as privy councilor to the Prince of Orange-Fulda, he in 1826 removed to Berlin and subsequently to Wartenberg, Silesia. His *Lieder zweier Liebenden* (3d ed., 1819) won for him great popularity in Germany towards the close of the eighteenth century. His *Gedichte* (rev. ed., 1821) contain the excellent *Episteln* and *Sinngedichte* (separately published, 2d ed., 1778). The latter are occasionally characterized by a vein of modern political satire. Consult Göckingk's correspondence with Bürger (q.v.) in Strodtmann, *Briefe von und an Bürger* (4 vols., Berlin, 1874), and Kasch, *Leopold von Goeckingk* (Marburg, 1909).

GOD (AS., OS., Dutch *god*, Goth. *guþ*, OHG. *got, cot*, Ger. *Gott*, of doubtful etymology, perhaps connected with Skt. *hū*, to call, or with Skt. *hu*, Gk. *χεῖν, chein*, to pour; the word is evidently originally a passive participle; the frequent derivation of *god* from *good*, AS *gōd*, Goth. *gōds*, OHG. *guot*, Ger. *gut*, is entirely erroneous). Two types of definition of God are possible. One is the maximum definition, which defines God in terms of the highest conceivable religious ideas. According to this, God is the eternal and infinite personal Spirit, the Creator and Governor of the universe, the loving Father of all men. The other is the minimum definition so framed as to include the god of any historic religion, however primitive. A wide variety of such definitions have been given, which may be summarized thus: an extrahuman power, treated as personal, and conceived of as exercising control over some sphere which affects human life. In primitive religion any spirit may, by gaining more power and so winning worshipers and a cult, become a god. Man needs help for various things, and those powers to which he feels that he can appeal in any personal way become for him gods.

The idea of gods once introduced, the tendency is towards a multiplication of gods, whence arises polytheism. A tendency soon becomes marked to ascribe to one god the control over some restricted portion of country or over the affairs of one family. This produces a "henotheism" within a restricted group of persons, which may be perfectly consistent with polytheism and polytheistic worship apart from the restricted circle to which this one god belongs. But with the growth of the family into a tribe, and of the tribe into a nation, the sphere of the god is also enlarged, and victories over other nations, as well as the attempt to find a single cause behind all things, will produce ultimately the idea of one god, beside whom all other gods are only pretended gods, having no real existence. Thus monotheism must develop. The Hebrew conception of God grew from an early tribal god to a national deity, caring for the welfare of the Hebrew nation. Under the prophets the conception came to be strongly moral, and Jehovah, the national God, became a God of social righteousness: "What doth the Lord require of thee but to do justly and to love mercy and to walk humbly with thy God?" (Mic. vi. 8.) The contact with other nations led the prophets to see that their God must be conceived as controlling the nations if he was to guide the fortunes of Israel. In this way Hebrew thought developed an ethical monotheism. By the time of the beginning of the Christian era the Hebrew idea of God was that of a Being, the sole cause of all things, omniscient and omnipotent, benevolent, rewarding the good and punishing the evil, and guiding the world to the fulfillment of His own purpose. The idea, however, was still nationalistic. While Jehovah was the God of the whole world, Israel was His particular care. This conception of God Christianity took over, only emphasizing the idea of God as a loving Father, and, when the new religion passed from the Hebrews to the Greeks, putting the Christian Church for the Hebrew nation as the object of God's peculiar care. Every age has a different conception of God, and the Christian idea has developed as the conceptions of ethics and of the brotherhood of the world have advanced. Theology has brought forward various proofs of the existence of God. 1. The first proof is the so-called cosmological, from the mere existence of a dependent world, which does not bear in itself the marks of eternal and independent existence, to an independent something which shall be its cause. This leaves the doctrine in a very vague condition. 2. The teleological proof adds definiteness to it. In innumerable individual objects, like the plants, in the adaptations of the chemical elements to each other, the construction of the bodies of animals and of the mind of man, and in the whole universe as revealed more and more by modern study, we see evidences of plan. The Cause of the world is therefore capable of making a vast plan; He possesses intelligence and will, i.e., rational personality. 3. The moral proof argues from the nature of man himself, especially as a moral being, to the nature of God as also moral, or benevolent, which argument is supplemented by the Christian argument which draws the conclusion from the experience of regeneration that God positively seeks to promote the holiness of men. 4. These arguments are completed by the ontological argument, which in its best form ascribes to the highest conception which man is able to form of God (the Christian conception) objective validity, on the basis of the proposition that it is fundamentally inconceivable that the highest conception at which the mind of man can arrive should be a mere subjective creation.

The modern objection to this line of proof began with Kant, who declared it to be an application of the principle of causality beyond the bounds set by nature as an intellectual principle given man for the knowledge of empirical objects. The Sensational school, which Kant was opposing, has also denied the application of causality to reach beyond experience on various grounds. Mill was chiefly influenced by the complexity of the investigation, and particularly by the difficulties created by the existence of pain and sin. Spencer, who has carried this school to its natural results and combined a developed theory of evolution with sensationalism, has based his objections upon the doctrine of the relativity of knowledge, which makes such a conception as that of a first cause essentially unintelligible. In a more popular form the objection is raised against the idea of God that it is incapable of proof, by which is meant such proof as is given to the propositions of natural science, experimental and tangible proof.

It has sometimes been claimed that the idea of God is innate in the soul. If by this is meant that every man has by nature the idea of one infinite person, the claim is manifestly false, for the existence of polytheism at once disproves it. But if it be meant that there are innate in the mind certain principles, such as that of causation, which impel the mind to look up from phenomena to their source, and that the examination of all the phenomena belonging to this sphere will finally give to man the knowledge of God, the proposition in this sense is true. The argument is thus mingled of a priori and a posteriori elements. The former are necessary as the rational foundation of the argument, the latter to give it contents and to lead it to the concrete result of the being of God. See Theism.

Bibliography. Among the numerous excellent treatises of recent times upon theism may be mentioned as the best: Orr, *Christian View of God and the World* (London, 1897); Flint, *Theism* (ib., 1886); id., *Anti-Theistic Theories* (Edinburgh, 1884); Martineau, *A Study of Religion* (Oxford, 1888); id., *The Idea of God* (Boston, 1887); Fiske, *Through Nature to God* (ib., 1899); Clarke, *The Christian Doctrine of God* (New York, 1909); Adeney, *The Christian Conception of God* (ib., 1912). For a modern theory of the origin of the idea of God, consult King, *The Development of Religion* (ib., 1910).

GODARD, gō'där', Benjamin (1849–95). A French composer, born in Paris. He was a precocious child and, after studying the violin with Richard Hammer, entered the Paris Conservatory, where his teachers were Vieuxtemps (violin) and Reber (composition). In 1865 a violin sonata was published, and shortly afterward Godard received a prize from the Institut de France. From this time on, his compositions followed each other rapidly. While not works of genius, they are characterized by felicity of expression and met with considerable popular favor. His most successful opera was *La vivandière*, produced at the Opéra Comique shortly after his death. He also wrote: *Pedro de Zalaméa* (1884); *Jocelyn* (1888); *Le Dante* (1890); *Jeanne d'Arc* (1891); and numerous symphonies, suites, concertos, and songs.

GODAVARI, gō-dä'vȧ-rē. One of the principal rivers of the peninsula of India, and the largest of the Deccan, rising within 50 miles of the Arabian Sea in the Western Ghats, near Dindori (Map: India, C 5). It flows southeast for 900 miles across the peninsula into the Bay of Bengal. Dividing at Rajamandry, it enters the sea by two principal mouths—the northern at the French town of Yanaon and the southern at Narsapur. About 23 miles above the head of the delta the Godavari emerges near Rampa from the Eastern Ghats. It is navigable for 300 miles. Its northern tributaries are the Purna, the Pranhita, the Indravati, and the Saveri; from the south it receives the Manjera and the Maner.

GOD'DARD, Arabella (Mrs. J. W. Davison) (1836–). An English pianist. She was born, of English parentage, in Brittany, studied in Paris under Kalkbrenner and in London under Mrs. Anderson and Thalberg, and made her first public appearance in 1850 at the Grand National Concerts at Her Majesty's Theatre. She continued her studies under Davison, whom she married in 1860. Her most brilliant success was in her interpretation of the last compositions of Beethoven. In 1873–76 she made a successful tour of the world, including America, Australia, and India, and in 1880 retired from professional concert giving.

GOD'DESS OF REASON. The new divinity set up by the French Revolutionists in their attempted reconstruction of religion in 1793. On November 10, in the cathedral of Notre Dame, changed into a Temple of Reason, the goddess was installed with much ceremony. The part of the goddess was taken by an actress, dressed in white and wearing the Phrygian cap and the tricolor. The cathedral was restored to its proper functions by Napoleon in 1802.

GODEBSKI, gō-dĕb'skē, Cyprien (1835–1909). A Polish sculptor, a son of Xaver Godebski. He was born at Méry-sur-Cher, France, and was educated at the Polish school, Batignolles, and in the studio of Jouffroy. He spent many years in Galicia and at St. Petersburg. His principal works include: "The Awakening," a marble statue (1886); "Children," a bronze group for a Polish school (1880); "The Angel of the Fatherland Protecting Two Orphans"; "Brutal Force Suffocating Genius" (Toulon Museum); busts of Rossini, Vieuxtemps, Zichy, Servais, Prince Gortchakov, Kraszevski, and others, and the statues of Generals Landon and Lassy, in the Vienna Arsenal. He also executed a fine monument of the composer Moniuszko, in Warsaw Cathedral; a monument to the heroes of the Crimean War, at Sebastopol; the tomb of the tenor Tamberlik, at Père Lachaise Cemetery, Paris; and various other monumental works. Many of his later statues are polychrome, e.g., "A Dream of Glory."

GODEBSKI, gō-dĕb'skē, Ksawerz or Xaver (1801–66). A Polish author, born at Frankenthal, a son of Cyprien Godebski, poet and patriot (1775–1809). He was for many years professor in a Polish school at Paris. His literary work includes the edition of his father's more important writings, works on politics and history, especially a life of Plater (1848), and the studies on social reform in Poland in the eighteenth century (1866), and on the spirit of the times (1860). He also translated several French plays into Polish.

GODEFROY, gŏd'frwä' (Lat. *Gothofredus*). The name borne by a family of distinguished scholars and jurists of French origin.—Denis Godefroy (1549–1622) was born at Paris and, after studying at Louvain under Ramus, completed his education at the universities of Cologne and Heidelberg. It was probably at this last place that he adopted Protestant tenets. In 1579 Godefroy quitted France and became a professor of law at Geneva. In 1589, having returned to France, he was made bailiff of the District of Gex; but, his house having been pillaged and his library burnt by the troops of the Duke of Savoy, he retired first to Basel and later to Strassburg, where in 1591 he was given the chair of Roman law and history. In 1605 the Elector Palatine of the Rhine called him to be head of the faculty of law at Heidelberg. In 1618 he was sent as envoy to Paris from Frederick V to Louis XIII. Though numerous offers were made to him, Godefroy preferred to remain at Heidelberg, but in 1621 the presence of the army of the Catholic League under Count Tilly forced him to seek refuge at Strassburg, where he died Sept. 7, 1622. His most important work was his edition of the *Corpus Juris Civilis* (Geneva, 1583), which was long the standard text. He was also the author of numerous works on jurisprudence and on the classics.—Théodore Godefroy (1580–1649) was the eldest son of Denis Godefroy. In 1602, after being educated at Geneva and Strassburg, he settled in Paris and abjured Protestantism. Although an advocate before the Parliament of Paris, he devoted most of his time to the study of history and eventually became the historiographer royal of France. During the latter half of the Thirty Years' War he was employed as one of the French diplomats at Cologne and Münster and helped negotiate the Peace of Westphalia in 1648. He died at Münster, Oct. 5, 1649. He was the author of numerous works in French history and politics and made a large and important collection of documents for the history of France and of other countries. This was continued by his son Denis (1615–81) and in 1749 found its way into the library of the Institut de France.—Jacques Godefroy (1587–1652), the younger brother of Théodore, passed his life as professor of law at Geneva and remained true to his Protestant convictions. He held many important public offices during his stay in Switzerland. He is known as the editor of the *Theodosian Code* (Lyons, 1665), upon which he worked for 20 years, and which is still used by jurists. Besides this, he published a multitude of works on law and jurisprudence, and he ranks higher as a scholar than even his learned father.—Others of the Godefroy family who were distinguished in their time are: Jean Godefroy, Sieur d'Aumont (1656–1732, the third son of the younger Denis, and an historian of note; Denis Charles Godefroy, Marquis of Meuilgloire (1795–1877), the family biographer and a scholar of ability. He published *Les savants Godefroy* and *Mémoires d'une famille pendant les XVIème, XVIIème, et XVIIIème siècles* (1873).

GODEFROY, gȯ̆d′frwä′, Frédéric (1826–97). A French literary historian. He was educated for the most part privately and early devoted his leisure to the study of French language and literature. His *Lexique comparé de la langue de Corneille* (1862) was crowned by the Academy. He also wrote a *Histoire de la littérature française depuis le XVIème siècle jusqu'à nos jours* (1859–78; 2d ed., 1878–81). With governmental support he prepared the voluminous and important *Dictionnaire de l'ancienne langue française et tous ses dialectes du IXème au XVème siècle* (10 vols., 1880–1903). This work, laboriously compiled from all authoritative printed and manuscript sources, remains, despite certain defects, a standard reference book.

GODERICH, gŏd′rĭch. See Ripon Frederick John Robinson, Earl of.

GODERICH. A popular summer resort and the county seat of Huron Co., Ontario, Canada; a port of entry on Lake Huron, at the entrance of Maitland River, and on the Grand Trunk and the Canadian Pacific railroads (Map: Ontario, C 6). It has a good harbor and steam communication with all lake ports. There are salt refineries, flour and lumber mills, an organ factory, iron foundries, tanneries, grain elevators, and manufactories of wheels, road machines, and knitting machines. The surrounding district supplies excellent limestone, sand, and clay for manufacturing purposes. Pop., 1901, 4158; 1911, 4522.

GODESBERG, gō′des-bĕrᴋ. A watering place in the Prussian Rhine Province, situated near the left bank of the Rhine, 4 miles below Bonn. It has an alkaline chalybeate spring, believed to have been known to the Romans, a hydropathic establishment, and numerous fine villas with gardens. It has extensive industries in quilting and brickmaking. A short distance from the village lie the ruins of the castle of Godesberg, erected by Archbishop Dietrich of Cologne in the thirteenth century. Pop., 1900, 8927; 1910, 10,644. Consult Dennert, *Godesberg, eine Perle des Rheins* (Godesberg, 1900).

GODET, gȯ̆′dȧ̊′, Frédéric (1812–1900). A Swiss Protestant theologian. He was born at Neuchâtel and was educated in that city and at Bonn and Berlin. In 1850 he was appointed professor of theology at Neuchâtel and in the following year received a pastorate which he held until 1866. In 1873 he helped to found the Evangelical church of Neuchâtel, independent of the state, and was a professor in its faculty of theology. As a prominent representative of Reformed orthodoxy, Godet exercised a very wholesome influence on the development of religious thought in Switzerland, further stimulated by his published works, particularly by his commentaries, which are marked by great delicacy of exegesis. He wrote: *Histoire de la réformation et du refuge dans le pays de Neuchâtel* (1859); *Commentaire sur l'évangile de Saint-Jean* (1863–65; 3d ed., 1881–88), which has been translated into English (1886), German, Dutch, and Danish; *Commentaire sur l'évangile de Saint-Luc* (1871; 3d ed., 1889; Eng. trans., 1875); *Commentaire sur l'épître aux Romains* (1879–80; 2d ed., 1890; Eng. trans., 1881); *Etudes bibliques* (4th ed., 1889; Eng. trans., first part, *Old Testament Studies*, 3d ed., 1885, second part, *New Testament Studies*, 6th ed., 1885); *Lectures in Defense of the Christian Faith* (4th ed., 1900).

GO'DEY, Louis Antoine (1804–78). An American publisher, born and educated in New York City. From 1830 to 1877 he conducted at Philadelphia *Godey's Lady's Book*, the first woman's periodical in the United States. Among his other publications were *Jarvis's Musical Library* and the *Young People's Book*.

GODFATHER AND GODMOTHER. The sponsors of candidates for baptism, and, in the Roman Catholic church, of candidates for confirmation. See Sponsors.

GOD′FREY, Sir Edmund Berry (1621–78). An English magistrate, born in Kent and educated at Christ Church, Oxford. He became a justice of the peace for Westminster, and in 1666 was knighted for his efficient work during the plague. In 1678 he received the depositions of Titus Oates (q.v.) concerning the "Popish Plot." Shortly afterward he was found dead near Hampstead. The public immediately accused the Roman Catholic priests of having murdered Godfrey, and subsequently a man named Miles Prance was induced to make a confession implicating the Catholics. As a result of this confession, three men were hanged for the crime; but Prance, when accused of perjury, finally (1686) admitted that he had concocted his evidence. Considerable controversy arose as to how Godfrey met his death—some claimed he had committed suicide—but though the evidence pointed to murder, the mystery was never solved. Consult John Pollock, *The Popish Plot* (London, 1903), and Alfred Marks, *Who Killed Sir E. B. Godfrey?* (ib., 1905).

GODFREY, Thomas (1704–49). A self-taught American mathematician, who acquired some reputation from an improvement which he made in Davis's quadrant. (See Sextant.) He was a man of intemperate habits, a humble artisan in Philadelphia, but he was sufficiently interested in science to learn Latin that he might read the better class of mathematical literature of the time. The improvement in the quadrant seems to have been due to him, but there was a dispute between him and John Hadley of England as to the priority of the invention. The Royal Society considered the claims of both parties and rewarded each, sending to Godfrey gifts to the value of $1000. The account in the *Philosophical Transactions* of the Royal Society of London (abridged ed., London, 1809, vol. vii, p. 667, for 1734) speaks of him as "having under the greatest disadvantages made himself master of the principles of astronomy and optics, as well as other parts of mathematical science," and as having made his invention in 1730, the first account of it appearing two years later.

GODFREY DE BOUILLON, de bōō′yôɴ′ (c.1058–1100). One of the leaders of the First Crusade and the first Latin ruler of Jerusalem. He was the son of Eustace of Boulogne and Ida, sister of Gozelo, or Godfrey, the Humpbacked, of Lower Lorraine. The year of his birth is uncertain, but it was about 1058. His family traced its descent from Charles the Great, and later legends made Lohengrin, "the Knight of the Swan," Godfrey's progenitor. In the strife over investiture (q.v.) he was on the side of the Emperor, and it was said that he was the first to scale the walls of Rome when it was attacked by Henry IV in 1084. The legends also recount how he was stricken with disease because of his sacrilege at Rome and then miraculously healed when he took the Crusader's vow. In 1089 he became Duke of Lower Lorraine. He was one of the leaders in the First Crusade (1096–99), but not commander in chief, and after the capture of Jerusalem was elected "Baron and Defender of the Holy Sepulchre." According to an untrustworthy legend, he was offered the title of King, but refused "to wear a crown of gold where the Savior had worn a crown of thorns." He held this dignity for about a year, and died July 17 or 18, 1100. Godfrey is described as a man of large stature and great bodily strength. Many feats of bravery and strength are ascribed to him, such as his combat single-handed with a ferocious bear, or his cleaving asunder the body of a Moslem emir with a single blow of his sword. He made an excellent and energetic ruler of Jerusalem. Many legends clustered about his name, and many deeds were falsely imputed to him. Consult: Sybel, *Geschichte des ersten Kreuzzuges* (Leipzig, 1900); Froboese, *Gottfried von Bouillon* (Berlin, 1879); Röhricht, *Die Deutschen im Heiligen Lande* (Innsbruch, 1894); Pigeonneau, *Le cycle de la croisade et de la famille de Bouillon* (Saint-Cloud, 1877). Hagenmeyer, *Gesta Francorum* (Heidelberg, 1890), gives a bibliography of all the best works on Godfrey. See Assize of Jerusalem; Crusade.

GODGIFU. See Godiva.

GODHAVN, gŏ̇d′häv′n. A town of Greenland, on the south coast of Disco Island (Map: America, North, N 3). It is the residence of the Danish Inspector of the Northern Inspectorate, and has some fishing industries. Godhavn, also called Lievely, is mainly known in America as the stopping place of many polar expeditions. Pop., 300, of whom five only are Danes.

GODIN, gŏ̇′dăɴ′, Amélie. See Linz, Amélie.

GODIN, gŏ̇′dăɴ′, Jean Baptiste André (1817–88). A French socialist, born at Esquehéries, in the Department of Aisne. He came from an artisan family, and received the meagre education which was given to boys of his class at that time. When 17 years old he began a trip through France, in order to perfect his skill as an artisan. Three years afterward he was a workman in Esquehéries. A small workshop which he established in 1840 prospered and in 1846 employed about 30 men. He removed to Guise, in order to find a better market for his wares. He found time to pick up a very fair education, and became deeply interested in the writings of certain socialists, especially Fourier. He contributed 100,000 francs to the unsuccessful project of Victor Considérant (q.v.) to found a Fourieristic colony in Texas. In 1859 he began the construction of the buildings for his coöperative association, or *familistère*, and before 1886 had fully established profit sharing. By his plan profits in excess of 5 per cent on capital were to be divided between labor and capital in the ratio of aggregate wages to aggregate minimum profits. Prior to this distribution, however, a sum was to be set aside for education, insurance against sickness and old age, etc. At his death he left almost his entire personal fortune (about 2,500,000 francs) to the association. Almost all the shares in the association are at present held by the workers, numbering some 1200.

Godin had some success in politics. He was elected president of the municipal commission of Guise in 1870, and member of the National Assembly in 1875. In 1882 he was made Knight of the Legion of Honor. He published several books, the chief of which are: *Solutions sociales* (1871); *La politique du travail et la politique des privilèges* (1875); *La souveraineté et les droits du peuple; le gouvernement et le vrai socialisme en action* (1883); *La république du travail et la réforme parlementaire* (1889). Consult Bernadot, *Le familistère de Guise et son fondateur* (Paris, 1889), and D'Isambert, *Les idées socialistes en France* (ib., 1905). See Fourierism.

GODIN, Louis (1704–60). A French astronomer, born in Paris. He studied at the Lycée Louis le Grand and under Delisle. On May 16, 1735, he started on an expedition to South America to measure a degree of the meridian by geodetic methods. He arrived at Quito, Peru, in February, 1736, established two astronomical stations in the Andes, and was subsequently appointed professor of mathematics at Lima, where, in 1746, he made important seismological studies during the famous earthquake. A year after his return to Europe, in 1752, he was appointed president of the naval academy at Cadiz, where he rendered valuable service during the earthquake of Lisbon. His principal works include: *Histoire de l'Académie des Sciences 1680 à '99* (1728); *El temblor de tierra de Lima, sus causas, efectos y consequencias* (1748); *Observations astronomiques au Pérou* (1752); *Des tremblements de terre en général, de ceux de Lima et Lisbon en particulier* (1753); *Les possessions espagnoles de l'Amérique du Sud* (1755).

GODIN DES ODONAIS, då zô′dô′nå′, Jean (1712–92). A French naturalist, born at Saint-Amand, France. Early in his life he went to Peru, where he was appointed to the chair of natural science and astronomy at Quito (1739). Several years later he began a botanical exploration of northern Peru and Ecuador, and afterward removed to Cayenne, where from 1750 to 1765 he explored the neighboring country and Brazilian Guiana. From here he traveled along the Amazon, on the banks of which he made further botanical investigations during a period extending over eight years. On these journeys he prepared illustrations of hundreds of mammals and birds, many of them before unknown, and collected more than 10,000 species of plants. Returning to France in 1773, he gave his collections to the Museum of Natural History at Paris. His numerous publications, comprising works on the botany and languages of South America, include: *Flore raisonnée du Pérou* (1776), containing more than 4000 species, with two volumes of illustrations, in more than 700 plates; *Les plantes de la Guayane* (1777); *Faune du Pérou* (1778), with numerous illustrations; *Flore de la Guayane* (1779), with three volumes of illustrations; *Grammaire comparée des langues indiennes de l'Amérique du Sud* (1784).

GÖDING, gẽ′dĭng (Bohemian *Hodonin*). A town in Moravia, Austria, on the right bank of the navigable March, which here forms part of the Hungarian boundary, about 70 miles northeast of Vienna. It is in a good agricultural district. The principal attraction is the Imperial castle, with its immense park. It has German and Czech high schools, cavalry barracks, a state horse depot, a tobacco factory, sugar refineries, a spirit distillery, a brewery, and several saw mills. Pop., 1900, 10,231.

GODI′VA, or **GOD′GIFU** (?–c.1080). According to legend, a Saxon lady of Coventry, in Warwickshire, who rode naked through the streets of the town out of devotion for her people. It is impossible to say whether the story is wholly fictitious or partly true. In its developed form the legend runs as follows: About the year 1040, Leofric, Earl of Mercia and Lord of Coventry, imposed certain onerous services and heavy exactions upon the inhabitants of the latter, of which they loudly complained. His wife, the Lady Godiva, having the welfare of the town at heart, besought her husband to give them relief, and was so earnest in her entreaties that at length, to escape from her importunities, the Earl said he would grant her the favor, but only on condition that she would ride naked through the town, supposing, from the modesty of Lady Godiva, that he had imposed an impossible condition. He was surprised with her answer: "But will you give me leave to do so?" As he could not in justice refuse, she ordered that proclamation be made that on a certain day no one should be out of doors, or even look from their houses; and, clothed only in her long hair, she rode through the town. Her husband, in admiration of her intrepid devotion, performed his promise. This circumstance was commemorated by a stained-glass window, mentioned in 1690, in St. Michael's Church, Coventry; and the legend that an unfortunate tailor, the only man who looked out of a window, was struck blind, has also found commemoration in an ancient effigy of "Peeping Tom of Coventry," probably an image of St. George, still to be seen in a niche of one of the buildings. By a charter of Henry III (1218), a fair is held at Coventry, beginning on Friday of Trinity week, and lasting eight days. The fair was formerly opened with a grand civic procession, a part of which was, in 1678, the representation of the ride of Lady Godiva. These processions were continued at intervals of from three to seven years until 1826. Some beautiful woman, who represented Lady Godiva, was the principal figure; but many other historical and emblematic personages were introduced. In 1848 the procession was revived with great splendor, and attracted 15,000 strangers. The ceremony has, however, fallen into disrepute, the last procession occurring in 1887. For a full discussion of the legend, consult Freeman, *The Norman Conquest* (Oxford, 1870–79); consult also Poole, *Coventry, its History and Antiquities* (London, 1870), and Harris, *Story of Coventry* (ib., 1911).

GOD′KIN, Edwin Lawrence (1831–1902). An American editor and publicist, born in Moyne, County Wicklow, Ireland, son of a Presbyterian minister who was also a journalist and a leader in the "Young Ireland" movement. The son graduated at Queen's College, Belfast, in 1851, and during the Crimean War (1854–56) was special correspondent of the London *Daily News.* In 1856 he came to the United States, and traveled in the South. In 1857 he settled in New York City, where he read law under David D. Field (q.v.), was admitted to the bar in 1858, and for several years practiced occasionally. From 1862 until 1865 he was a correspondent of the *Daily News* and an editorial writer for the New York *Times.* In 1865 he established and became editor of the *Nation,* a weekly fashioned after the London *Spectator,* whose proprietorship was assumed in 1866 by himself, J. M. McKim, and F. L. Olmsted (q.v.). In 1881 the *Nation* was merged with the *Evening Post,* of which it became the weekly edition, and Godkin was thereafter an editor (in 1883–99 editor in chief) and proprietor of the combined publications. As a journalist, he devoted little attention to the organization of newspaper service, but he was one of the foremost leader writers in the history of the American press. His editorials in the *Nation* influenced in manifold ways the best thought of the time, and from 1884, previous to which the paper had been avowedly Republican, he made the *Evening Post* the leading independent American daily. His style was noteworthy for its directness, its pith, and (to quote Henry James) "admirably aggressive and ironic editorial humor, of a quality and authority new in the air of a journalism that had meant for the most part the heavy hand alone." Godkin's critical estimates were singularly acute and mainly just, but possibly too purely intellectual to be often sympathetic. He was a prominent figure in reforms affecting the causes of sound money, of reconstruction, and of the civil service. In him the idea of public office as a public trust had undoubtedly its chief exponent in the United States. He consistently and severely opposed the "spoils" or close party system in American politics, as well as "boss" or "machine" rule in various forms. His fearlessness often exposed him to disapproval, and not seldom to abuse. In preparation for the New York City municipal campaign of 1890, he printed in the *Post*, with scathing editorial comment, a series of biographies of Tammany Hall leaders, which resulted in the issuance against him of several warrants of arrest on charges of criminal libel. The cases were dismissed for lack of prosecution. He received the degree of D.C.L. from Oxford University in 1897. A memorial Godkin lectureship at Harvard upon "The Essentials of Free Government and the Duties of the Citizen" was founded in 1903. He published a *History of Hungary, A.D. 300–1850* (1853; 2d ed., 1856); an excellent work on *Government* (1871), in the "American Science Series"; and *Reflections and Comments* (1895), *Problems of Modern Democracy* (1896), and *Unforeseen Tendencies of Democracy* (1898) —all valuable collections of papers respectively from the *Nation*, the *Atlantic*, and other sources. Consult Ogden, *Life and Letters of E. L. Godkin* (New York, 1907).

GOD′LEY, Alfred Denis (1856–). A British educator, born in County Leitrim, Ireland, and educated at Harrow and at Balliol College, Oxford. He was assistant master at Bradfield College in 1879–82 and fellow and tutor of Magdalen College in 1883–1912, and in 1910 became public orator of the university. A remarkably clever writer of light verse, he contributed some brilliant parodies to the *Oxford Magazine;* edited, with Prof. Robinson Ellis, the *Nova Anthologia Oxoniensis* (1899); published an edition of Tacitus' *Histories* (1887 and 1890) and a translation of Horace's *Odes* (1898); and wrote *Verses to Order* (1892 and 1903), *Aspects of Modern Oxford* (1893), *Socrates and Athenian Society* (1895), *Lyra Frivola* (1899), *Second Strings* (1902), *Oxford in the Eighteenth Century* (1908), *The Casual Ward* (1912); and "Senecan Tragedy," in *English Literature and the Classics* (Oxford, 1914).

GOD′MAN, John D. (1794–1830). An American physician, born in Annapolis, Md. He graduated at the University of Maryland in 1818, was professor of anatomy in the Medical College of Ohio, was one of the editors of the Philadelphia *Journal of Medical Science*, and in 1826–27 was professor of anatomy and physiology in Rutgers Medical College in New York. He was the author of many articles in the *Encyclopædia Americana*, and in addition published: *American Natural History; Anatomical Investigation* (1824); and *Rambles of a Naturalist.*

GODO′DIN. A seventh-century epic by the Welsh bard Aneurin, who was the son of the chief of the Gododin tribe, founded on the week's battle of Cattraeth (603). It is about 900 lines in length, and in 1852 was translated by Rev. John Williams, at Ithel. John Morley has also translated parts of it, and the poet Gray founded his "Death of Hoel" upon it. Consult Elton, *Origins of English History* (London, 1882).

GÖDÖLLÖ, gẽ′dẽl-lẽ. A market town in Hungary, about 16 miles northeast of Budapest. It is chiefly noteworthy for its royal château of more than 100 rooms, with an extensive park, formerly the property of the Princes Grassalkovich, later of Baron Sina, but purchased in 1867 by the Hungarian nation and presented to the King at his coronation. It is now the royal summer residence; yearly the court holds a great hunt here. In the vicinity is Besnyö, a noteworthy pilgrims' resort. It has a school of hand weaving. Pop., 1900, 5893. At Gödöllö, April 6–7, 1849, the Hungarians under Görgey defeated the Austrians under Windischgrätz. The victory led to the proclamation of Hungarian independence, April 14, 1849. Consult Ripka, *Gödöllö* (Vienna, 1898).

GODOL′PHIN, Sidney, first Earl of (1645–1712). An English statesman. The third son of Sir Francis Godolphin, he was born at Helston, Cornwall, but of his youth little is known. In 1662 he was page of honor to Charles II, and in 1678 he became Master of the Robes. From 1668 to 1679 he was a member of Parliament for Helston, then two years for St. Mawes. In 1678 he was one of the commissioners sent to Holland to negotiate the Peace of Nimeguen. Next year the government appointed him Lord of the Treasury. In 1684 he was made First Commissioner of the Treasury and created a peer, with the title of Lord Godolphin of Rialton. Although his dislike of Roman Catholicism led him to vote for the exclusion of the Duke of York from the succession, on the Duke's accession as James II, Godolphin became chamberlain to the Queen; in 1686 he was again Commissioner of the Treasury; and afterward the King gave him a place on the commission sent to treat with William of Orange. In 1690 William appointed him First Lord of the Treasury, and five years afterward one of the seven lords justices for the administration of government during the King's absence. As Godolphin was guilty of secret correspondence with James II at Saint-Germain, he resigned his office in trepidation upon Sir John Fenwick's confession. When Fenwick was beheaded and his story discredited, however, Godolphin again became Lord of the Treasury (1700). Appointed Lord Treasurer on the accession of Anne (1702), he remained head of the home government during eight years, mainly through the influence of the Duke of Marlborough, whom Godolphin stanchly supported with funds for the prosecution of the Duke's wars. In 1706 Godolphin was created Earl of Godolphin and Viscount Rialton. His position as head of the Whig government came to an end in 1710, when he fell from power and was supplanted by Harley. He died at St. Albans, Sept. 15, 1712. A man of remarkable intelligence and of business-like habits, he was thorough in everything he did, and in an age of corruption he kept his hands pure. Consult: Elliot, *Life of Sidney, Earl of Godolphin* (London, 1888), very favorable; Collins, *Peerage* (9 vols., ib., 1812); Evelyn, *Diary* (4 vols., ib., 1879); Clarke, *Life of James II* (2 vols., ib., 1816); Macpherson, *Original Papers* (2 vols., ib., 1775); Burnet, *History of my Own Time*

(Oxford, 1833); and Walpole, *Essays Political and Biographical* (London, 1908).

GODOLPHIN BARB, The. See Barb.

GO'DON, Sylvanus William (1809–79). An American naval officer. He was born in Philadelphia; entered the navy as a midshipman in 1819; served in the Mexican War; and, in command of the *Mohican*, took part in the attack on Port Royal in 1861. In 1863 he became commodore, and in the attacks on Fort Fisher (q.v.) commanded a division of Admiral Porter's fleet. He was made rear admiral at the close of the war; commanded the South Atlantic squadron in 1866–67; was commandant of the Brooklyn Navy Yard in 1868–70; and was retired in 1871.

GODOWN' (Malay *gadong, godong*, warehouse). A term applied in the East Indies and in most of the Orient to a storehouse or building located on or near a wharf and chiefly used for the storage of goods. The term is believed by some to be a modification of a Dutch word indicating storehouse; by others it is believed to have come into use from the circumstance that most of the storehouses in the East Indies were formerly below the surface of the ground.

GODOWSKI, gȯ-dŏv'skē, Leopold (1870–). A Polish-American pianist. He was born at Vilna, in Russian Poland, and received his first instruction from local teachers. From 1881 to 1884 he was student at the High School of Music, Berlin, coming from there to America on an extended concert tour (1884–85). From 1886 to 1890 he studied with Saint-Saëns in Paris. During the next two years he made his second tour of America. From 1895 to 1900 he was director of the pianoforte department of the Chicago Conservatory. In 1900 he resumed playing again in Europe, meeting everywhere with extraordinary success. When he was appointed director of the *Klaviermeisterschule* at Vienna in 1909 he settled definitely in the Austrian capital, but continued at the same time his extended concert tours. During the seasons of 1912, 1913, and 1914 he visited the United States again. The most conspicuous quality in his playing is a dazzling, fabulous technique, while he is lacking in soulfulness and poetic conception. His numerous paraphrases of works by Chopin, Weber, Henselt, and J. Strauss make extraordinary demands upon the player's technical execution. His original compositions consist of a sonata in E minor, 24 pieces published under the title *Renaissance*, and 24 others entitled *Walzermasken*.

GODOY, gȯ-dō'ē, Manuel de, Duke of Alcudia (1767–1851). A Spanish statesman. He was born at Badajoz, of a noble family in straitened circumstances. At the age of 17 he entered the King's bodyguard at Madrid, where his personal attractions gained him the favor of Charles IV, and of his Queen, Maria Luisa. Honors and titles were heaped upon him and he became, in 1791, lieutenant general and grandee of Spain, with the title of Duke of Alcudia. The next year he was made Prime Minister, and, failing to save the life of Louis XV, he declared war against the French Republic, which resulted disastrously for Spain. To secure peace Godoy negotiated the Treaty of Basel, for which he was severely criticized, though the King rewarded him with the title of the Prince of the Peace. In 1797 he was removed from the office of Minister, retaining all his honors and emoluments and continuing to exercise a dominating power in Spanish politics. Returning to power in 1801, he entered into an alliance with France against Portugal, and invaded the latter country in command of the allied forces. The brief "War of the Oranges" was ended by the Treaty of Badajoz, by which Portugal closed her ports to England and ceded Olivenza and its territory to Spain. As a reward for this exploit Godoy was made generalissimo of the Spanish forces on land and sea. The ill success of the war against England, culminating in the defeat of Trafalgar, stirred up great popular hatred for Godoy, while his sudden elevation incited the hostility of the envious nobles. The Crown Prince Ferdinand placed himself at the head of a court faction, and Godoy's attempt to stir up the King against the Prince only served to excite popular feeling. When Godoy, upon the invasion of Spain by the French troops in 1808, prepared to escape with the King and the Queen to Mexico, an insurrection broke out at Aranjuez. The King was forced to imprison the hated Minister to save his life from the mob. Napoleon, who wished to make use of Godoy in his raid on the Spanish crown, summoned him to Bayonne, where he signed Charles's act of abdication in favor of his son Ferdinand. (See Charles IV; Ferdinand VII.) The latter part of his life was spent at Rome and, after 1830, in Paris. Reduced to straitened circumstances for a long time, he received back part of his confiscated property in 1847, together with his titles. He died in Paris, Oct. 7, 1851. His *Memorias Críticas apologéticas para la historia del reinado del Señor don Carlos IV de Bourbon* were published in English (London, 1836) and in French by Esménard (Paris, 1836). Consult Ovila y Otera, *Vida política y militar de D. M. Godoy* (Madrid, 1844), and D'Auvergne, *Godoy, the Queen's Favorite* (Boston, 1913).

GOD SAVE THE KING (or **QUEEN**). The national anthem of Great Britain, of which the music by adoption is that of several of the German states. It is played and sung in every part of the British Empire alike on solemn and festive occasions. Its origin has long been a subject of controversy. The contentions that it is of French or Scottish origin have been disproved, and according to Chrysander (*Jahrbücher I*, 287–407) it is almost certain that Henry Carey (q.v.) is the author of the hymn as we know it to-day. He is credited with having composed both words and music about 1740, though he never claimed the song as his, and though none of his friends put forward such a claim until his son, some fifty years later, petitioned the government for a pension on the ground that his father had written the hymn. The evidence which he adduced in support of this was purely circumstantial, and the petition was refused. On the contrary, there are traces of the existence of the song, or a similar one, long before Carey's time. A Latin hymn, "O Deus Optime," which still exists, and whose words are a counterpart of the present hymn, was sung in 1740. As for the music, John Bull (c.1563–1628) wrote an "ayre," still existing, which is identical in rhythm and similar in melody to "God Save the King." The hypothesis, backed by considerable circumstantial evidence, is that the above Latin words, or their prototypes, were written in 1688, and set to Bull's "ayre" by their author. There is record of such a hymn having been sung in King James's Chapel. The song would naturally be preserved by the Stuarts, and the music, passing through various popular transformations, would ultimately reach its present form. It will be seen that this theory does not preclude Carey from having translated the words and given the final shape to the music.

The words and music were first published anonymously in the *Harmonia Anglicana* (1742), and appeared in the *Gentleman's Magazine* (1745). It has been chosen for a national air in Prussia, where it is sung to the words *Heil dir im Siegerkranz*, and it was sung in Russia until the new anthem was written in 1833. In the United States it has long been known as the air to which "My Country, 'Tis of Thee" is sung. Consult: Bateman, "The National Anthem," in the *Gentleman's Magazine*, vol. cclxxv (London, 1893), and Hadden, "The 'God Save the Queen' Myths," in *Argosy*, vol. lxxii (ib., 1900); Cummings, *God Save the King* (ib., 1902); also Chappell, *Collection of National Airs* (ib., 1838–40). See National Hymns.

GOD'S FOOL. A novel by Maarten Maartens (1892), considered by the author his masterpiece. The fool, Elias Lossel, by accident in childhood became blind, deaf, and obscured in mind. In spite of all he had a sweet and loving nature. Handsome and wealthy, he was at last the victim of his half brother's greed. The story gives a realistic picture of life in a small Dutch city.

GOD'S TRUCE. See Truce of God.

GODTHAAB, gŏ̇t′hạʙ (Dan., good hope). A town and harbor of Greenland, on the west coast, the capital of the Danish Southern Inspectorate and the residence of the Danish Inspector (Map: America, North, N 3). It was founded by Hans Egede in 1721 and is the oldest colony in Greenland. Pop., of the district, about 1000, of whom less than 20 are Danes. Of these about 150 are at Godthaab and 110 at Ny (New) Hernnhut, near by, the former headquarters of the Moravian missionaries.

GOD TREE. See Cedar.

GODUNOV, gŏ̇′dụ-nŏf, Boris (c.1551–1605). A czar of Russia. He became to all intents Regent during the reign of Feodor I (1584–98). In 1591 he is said to have caused the murder of the Czarevitch Demetrius, and in 1598, upon Feodor's death, was elected to the throne. In 1595 he recovered the territory previously lost to Sweden. He had previously (1591) defeated the Khan of the Crimean Tatars. While Regent, he recolonized Siberia, placed the Muscovite church on an equal footing with the other Eastern churches, and forbade (by the famous *ukaz* of 1587) the transfer of peasants from one landowner to another—an edict of far-reaching consequences. As Czar, he appears to have been in the main clement and progressive. But the favor shown by him to foreigners and numerous innovations introduced by him resulted in considerable popular discontent. Thus, southern Russia was prepared to revolt to the standard of the first false Demetrius in 1604. Godunov's history has been utilized by Pushkin in a drama of the name, for a German rendering of which consult Von Bodenstedt's translation of the complete works of that author (vol. iii, Berlin, 1855). It has also inspired a charming opera by the Russian composer, Moussorgsky (q.v.).

GOD′WIN, or **GODWINE** (?–1053). An earl of the West Saxons. Nothing is known definitely of him until 1018, when he is described as *dux*, or earl. About 1020 he was Canute's most powerful official. More than any other person he contributed to the elevation of Edward the Confessor to the English throne, and from that time Godwin was the head of the national party, as opposed to the Norman court favorites. He was Earl of Wessex and enormously wealthy; his son Swegen was Earl of Hereford, Gloucester, and Oxford; his son Harold was Earl of East Anglia; his wife's nephew, Beorn, was Earl of Hertfordshire and Buckinghamshire; and his daughter Edith was Edward's Queen. As the Norman party became powerful, Godwin's influence over the King declined. The crimes of his son Swegen, who was outlawed for the seduction of an abbess and the murder of his cousin Beorn, weakened his position. Finally, in 1051, when Godwin refused to obey the orders of Edward, to punish the citizens of Dover on account of complaints of ill treatment made by the Normans, he lost the King's favor, was outlawed, and fled to Flanders. Godwin attempted to treat with the King, but, finding this of no avail, resorted to violence, encouraged in this by the promises of support extended him everywhere in England. In September, 1052, he sailed up the Thames with a strong fleet and was enthusiastically received by the people. The King yielded and on September 15 restored to him and his family all his property which had been confiscated. Soon after Godwin became ill, and died, April 14, 1053. Consult Freeman, *The Norman Conquest*, vols. i and ii (Oxford, 1870–79), for a favorable view of Godwin, and Green, *The Conquest of England* (London, 1883), for a rather unfavorable estimate. Consult also Hodgkin, *History of England from Earliest Time to Norman Conquest* (London, 1906), and Oman, *England before the Norman Conquest* (New York, 1910–).

GODWIN, Francis (1562–1633). An English Bishop and author, born at Hannington, Northamptonshire. He studied at Christ Church, Oxford, graduating in 1580, took orders, and became rector of Sampford, and afterward vicar of Weston-in-Zoyland and subdean of Exeter (1596). His *Catalogue of the Bishops of England* (1601) attracted the attention of Queen Elizabeth, who made him Bishop of Llandaff. In 1617 he was transferred to the see of Hereford by James I. He revised his *Catalogue* several times (1615 and 1616) and also wrote *Rerum Anglicarum Annales* (1616; Eng. version by his son, 1630). The best known of his works is *The Man in the Moone, or a Discourse of a Voyage Thither by Domingo Gonsales, the Speedy Messenger* (1638). It is supposed to have influenced Cyrano de Bergerac's *Voyage to the Moon*, as it was translated into French by J. Baudoin (1648), and traces of it seem to appear in parts of *Gulliver's Travels*.

GODWIN, Mary Wollstonecraft (1759–97). An English miscellaneous writer. She was born at Hoxton, near London, April 27, 1759, and was of Irish descent. Her mother died in 1780, and, owing to the brutality of her father, Mary and her sisters were compelled to leave his house. Mary earned her living as school-teacher and governess until 1788, when she settled in London and was employed by Johnson the publisher as reader and translator. While at Paris in 1792 she met Gilbert Imlay, an American merchant and author. After bearing to him a daughter she was deserted. On March 29, 1797, she married William Godwin, and became the mother of Mary, the future Mrs. Shelley. She died Sept. 10, 1797. The outline of her career contributed to the plot of Mrs. Amelia Opie's *Adeline Mowbray* (1804). Mrs. Godwin was one of the "advanced women" of her time. Her most notable work is *Vindication of the Rights of Women* (1792), a conspicuous landmark in the history of feminism, which has anticipated the claims for greater freedom, personal, social, and political, that are the marks of the woman's movement of a century later. In it she attacked Rousseau's ideal woman, the heroine of novels and boarding schools. She advocated the establishment of government day schools and maintained the right of women to enter the professions and politics. In short, her thesis was the equality of the sexes. Among her other works are: *Thoughts on the Education of Daughters* (1787); *Original Stories from Real Life* (1788); *Vindication of the Rights of Men*, a letter to Burke (1790); *Posthumous Works*, containing "Wrongs of Women," fragment of a novel, and "Letters and Miscellaneous Pieces" (4 vols., 1798). Consult: Godwin, *Memoirs of the Author of a Vindication of the Rights of Women* (London, 1798); Paul, *Mary Wollstonecraft: Letters to Imlay*, with memoir (ib., 1879; and a good later edition, New York, 1908); Pennell, *Life of Mary Wollstonecraft* (Boston, 1884); E. Rauschenbusch-Clough, *Study of Mary Wollstonecraft and the Rights of Woman* (New York, 1898); G. R. S. Taylor, *Mary Wollstonecraft* (ib., 1911); W. Godwin, *Elopement of Percy Bysshe Shelley and Mary Wollstonecraft Godwin* (privately printed, St. Louis, Mo., 1912), with commentary by H. B. Forman.

GODWIN, Parke (1816–1904). An American journalist and author. He was born in Paterson, N. J., Feb. 25, 1816, and after graduating at Princeton, in 1834, practiced law for a short time in Kentucky, but after 1837 was for many years in the main connected with the New York *Evening Post*, of which the poet Bryant, his father-in-law, was for so long chief editor. Godwin conducted in 1842 a weekly, the *Pathfinder*, contributed much to the *Democratic Review*, was one of the editors of *Putnam's Magazine*, deputy collector in the New York Custom House under President Polk, and an early member of the Republican party, though a consistent advocate of free trade. Two volumes of essays from *Putnam's Magazine* are gathered in *Out of the Past* (1870). Among his numerous other publications may be mentioned: *A Popular View of the Doctrine of Fourier* (1844); *Democracy, Civic and Constructive* (1844); *Vala: A Mythological Tale* (1851); *Political Essays* (1856). Godwin compiled a *Handbook of Universal Biography* (1851) and *Cyclopædia of Biography* (1863). He edited the *Works of W. C. Bryant*, with a *Life* (4 vols., 1884), and made translations from the prose of Goethe, Fouqué, and Zschokke. He also wrote an ingenious but rather erratic *New Study of Shakespeare's Sonnets* (1900).

GODWIN, Thomas (1587–1642). A Church of England scholar. He was born at Wookey, Somersetshire; educated at Oxford; was rector of Brightwell, Berkshire, and died there March 20, 1642. He is remembered for his English treatise on Roman antiquities, with the Latin title *Romanæ Historiæ Anthologia* (1614); and *Moses and Aaron, or Civil and Ecclesiastical Rites Used by the Ancient Hebrews* (1625).

GODWIN, William (1756–1836). An English novelist and political writer. The son of a dissenting minister, he was born at Wisbeach, Cambridgeshire, March 3, 1756. After studying at the Hoxton Presbyterian College, he became minister at Ware in Hertfordshire and in 1780 minister at Stowmarket in Suffolk. Having been shaken in his religious belief, he gave up preaching in 1783 and by 1787 he was "a complete unbeliever." He was already devoting himself to literature. After a *Life of Chatham* (1783), *Sketches of History, in Six Sermons* (1784), and considerable hackwork, he published the famous *Enquiry Concerning Political Justice* (1793), in which were presented the most radical theories of French philosophy on morals and government. By this book he is best known. It was followed by *The Adventures of Caleb Williams* (1794), a remarkable novel, intended to illustrate the political views advanced in the *Political Justice* and by *The Enquirer* (1797), a collection of essays on morals and politics. In 1796 he formed an alliance with Mary Wollstonecraft (q.v.). After some months they yielded so far to custom as to be married. His wife died a short time after, in giving birth to a daughter, the future wife of the poet Shelley. In 1799 he published a successful romance entitled *Saint Leon.* In 1801 he married a Mrs. Clairmont. To secure a more certain support, Godwin and his wife started in 1805 a small publishing business, which, however, failed in 1820; but he also worked indefatigably with his pen to the end of his life. He wrote many school books; *Life of Chaucer* (1803); *Fleetwood*, a novel (1805); *Mandeville*, a novel (1817); *Of Population* (1820), a reply to Malthus; *History of the Commonwealth of England* (1824–28); *Cloudesley*, a novel (1830); *Thoughts on Man* (1831); *Deloraine*, a novel (1833); and *Lives of the Necromancers* (1834). As he grew old, he modified his opinions on politics and society, and especially on marriage, which he warmly commends in some of his later works. Many of his books were translated into foreign languages. He died in London, April 7, 1836. Consult: Paul, *William Godwin: His Friends and Contemporaries* (London, 1876); Hazlitt, essay in the *Spirit of the Age* (ib., 1825); Stephen, *English Thought in the Eighteenth Century* (ib., 1876). See Godwin, Mary Wollstonecraft.

GODWIN-AUSTEN, gŏd′wĭn-a̤s′ten. One of the highest mountain peaks in the world, exceeded probably by Mount Everest only, situated in the Mustagh Range of northern Kashmir (Map: India, C 1). It was named after Lieutenant Colonel Henry H. Godwin-Austen (q.v.). Its altitude is placed at 28,265 feet. It is also called K 2.

GODWIN-AUSTEN, Henry Haversham (1834–). An English topographer and geologist and one of the pioneers of scientific geography. He was born at Teignmouth, the son of Robert A. C. Godwin-Austen; was educated at the Royal Military College, Sandhurst; obtained a commission in the Twenty-fourth Regiment of Foot in 1851 and joined it in India in the following year. He served with distinction in the Second Burmese War and after its close became an assistant topographer in the East Indian Trigonometrical Survey. In 1857 he was connected with the Government Survey in Kashmir, where he made the discovery of the important Baltoro glacier at the head of the Shigar River. In 1862–63 he conducted surveys in

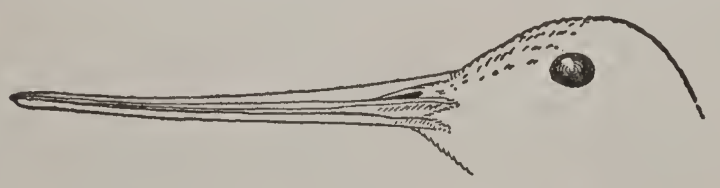
Ladakh, making 13 ascents of mountain peaks, among them that of Mata, 20,607 feet high. He served in the Bhutan campaign in 1874 and took part in the expedition against the Daflas in the eastern Himalayas. He retired from the army in 1877 with the rank of lieutenant colonel. He was elected a fellow of the Royal Geographical Society, in 1910 was presented the Founder's medal for his work in exploration, and Mt. Godwin-Austen (q.v.) was named for him. His writings include numerous important articles and monographs for various scientific magazines and society reports. His works include: *On the Land and Fresh Water Mollusca of India* (1882–99), a monumental work in 11 parts, and *The Fauna of British India*, vol. *Mollusca* (1908).

GODWIN-AUSTEN, Robert Alfred Cloyne (1808–84). An English geologist, born near Guildford, the son of Sir H. E. Austen. He was educated at Midhurst School, at a military college in France, and at Oxford, where, after graduation, he was elected a fellow of Oriel College. Here he studied geology under William Buckland. In 1833 he married a daughter of Gen. H. T. Godwin, upon whose death in 1854 he prefixed, by royal license, the name of Godwin to his own. His geological studies and discoveries, covering a period of more than half a century, were extensive and valuable, and his contributions to geological literature were considered authoritative, particularly the result of his investigations in Devonshire. He edited, as literary executor, the *Memoir on the Fluvio-marine Tertiaries of the Isle of Wight* (1856), left by Edward Forbes in manuscript, and completed the *Natural History of the European Seas* (1859), begun by the same author. In addition to these he wrote numerous original articles and notes in various geological journals. He was made a fellow of the Geological Society of London in 1830, a fellow of the Royal Society in 1849, and was twice president of the Geological Section of the British Association.

GODWINE. See Godwin.

GODWIN'S OATH. A proverbial expression for a false oath, originating in the story that Godwin, Earl of Kent, was choked to death by a piece of bread while calling Heaven to witness his innocence of the murder of Alfred, the brother of Edward the Confessor.

GOD′WIT (of doubtful etymology; possibly from AS. *gōd*, good + *wit*, wit; hardly from *gōd*, good + *wiht*, wight, creature, or from *god*, God + *wit*, wit, or *wiht*, wight, creature). A genus (*Limosa*) of large curlew-like shore birds of the snipe family (Scolopacidæ), with very long bill, slightly curved upward, and long slender legs. All the species frequent marshes and shallow waters, often those of the seacoast, where they seek their food by wading and plunging the long bill into the water or mud like snipes. They sometimes also run after small crustaceans or other animals and catch them on the sands from which the tide has retired. All are noted for their loud, yelping cries. Two species are confined to North America—the great marbled godwit (*Limosa fedoa*) and the Hudsonian godwit (*Limosa hæmastica*). Neither is very numerous, and both are visible only when passing back and forth from their northern breeding haunts to their tropical winter homes; the marbled godwit, however, nests in Iowa and northward. The general hue of these birds is rufous or cinnamon, the marbled godwit being paler than the Hudsonian, but both vary greatly with age, sex, and season; the former has the reddish tail barred with black and without any white, while the latter has a black tail broadly white at the base. The females are uniformly larger than the males. Godwits build their nests anywhere on the ground, not necessarily near water, and lay three and four eggs, olive drab spotted with umber brown. Four or five other species of godwit are found in the Old World. The flesh of all is good, and in Elizabethan England it was regarded as an expensive delicacy, often celebrated in the prose and verse of the period. The incessant pursuit of this bird, particularly by netting on the fens, nearly exterminated it in Great Britain. It is taken by gunners whenever encountered, but is not much sought after nor especially valued either for sport or food. See Colored Plate of Shore Birds.



BILL OF MARBLED GODWIT.

GOEBEL, gō′bel, Julius (1857–). An American Germanic scholar, born at Frankfort-on-the-Main, Germany. He was educated at the universities of Leipzig and Tübingen (Ph.D., 1882). He came to the United States in 1882; was instructor in German at Johns Hopkins University (1885–88), professor of Germanic philology and literature at Leland Stanford (1892–1905), and lecturer on Germanic philology at Harvard (1905–08), and became professor of Germanic languages at the University of Illinois in 1908. He was editor of the *Belletristisches Journal* in 1888–92 and of the *Journal of English and Germanic Philology* after 1909; edited Goethe's *Poems* (1901), Schiller's *Poems* (1903), Goethe's *Faust* (1907), *German Classics* (1909), *Year Book* of the German American Historical Society (1913), *Germanic Literature and Culture* (1913); and wrote *Ueber die Zukunft unseres Volkes in Amerika* (1883); *Ueber tragische Schuld and Sühne* (1884); *Gedichte* (1895); *Das Deutschtum in den Vereinigten Staaten* (1904).

GOEBEL, gẽb′el, Karl, Ritter von (1855–). A German botanist, born in Bietigheim, Baden, and educated at Tübingen, Strassburg, and Würzburg. He became professor of botany at Rostock (1882), at Marburg (1887), and at Munich (1891), where he was director of the New Botanical Gardens. He traveled in India, Ceylon, and Java in 1885–86, in Venezuela in 1890–91, and in Australia in 1898–99. Goebel received honorary degrees from Cambridge, Geneva, and St. Andrews, and was knighted in 1909. Among his important works are: *Grundzüge der Systematik und der speziellen Pflanzen-Morphologie* (1882; in English, by Garnsey, 1887); *Vergleichende Entwicklungs-geschichte* (1883); *Pflanzenbiologische Schilderungen* (1893); *Organographie der Pflanzen* (1898–1901; 2d ed., 1913; in English, by Bayley Balfour); *Einleitung in die experimentelle Morphologie* (1908).

GOEBEL, gō′bel, William (1856–1900). An American politician, born in Sullivan Co., Pa. He removed to Covington, Ky., in early boyhood, studied law, was admitted to the bar, and won a reputation as a trial lawyer, and as a political speaker and leader in the Democratic party. In 1887 he was elected to the Kentucky State Senate, to which body he continued to be reëlected at every election up to and including 1898. He built up a strong political machine. One of his personal quarrels culminated in his shooting and killing Col. John D. Sandford, for which he was acquitted on the grounds of self-defense. In 1897 he secured the passage of the "Goebel law," relieving the courts of all power in the appointment of election officials, and creating a State election commission of three members, chosen by the Legislature, which should have the power to appoint local boards on the same principle. This act was intended to assure Democratic ascendancy. It was passed over the veto of Governor Bradley (Republican), and was held constitutional by the State Supreme Court in December, 1898. In June, 1899, Goebel was nominated for Governor by the Democratic party. Seceding Democrats nominated John Young Brown, and W. S. Taylor, the Republican candidate, was elected by about 2300 votes. Goebel contested the election, and a legislative committee was about to report in Goebel's favor, when, on January 30, he was shot in front of the State Capitol by an assassin concealed in a neighboring building. The Democratic members of the Legislature immediately declared him Governor, and the oath of office was administered to him on January 31. He died on February 3. Consult *My Own Story* (Indianapolis, 1905), by Caleb Powers, Republican nominee for Secretary of State, convicted of complicity in the murder of Goebel.

GOEBEN, gẽ′ben, August von (1816–80). A German soldier. He was born at Stade in Hanover, entered the Prussian military service at the age of 17, but in 1836 went to Spain as a partisan of Don Carlos, and took an active part in the fighting between 1836 and 1840, being repeatedly wounded and twice taken prisoner. After the end of the Carlist War he returned to Germany and wrote an account of his Spanish experiences, entitled *Vier Jahre in Spanien* (1841). Reëntering the Prussian army, where he served on the staff, he took part in the campaign against the revolutionists in Baden in 1849, and became, in 1855, chief of staff of the Fourth Army Corps. In 1860 he was Prussian attaché with the army of the Spanish General O'Donnell in the campaign in Morocco. In 1864 he took a prominent part in the war against Denmark and became in the following year lieutenant general and commander of the Thirteenth Division. At the head of this division he first entered Hanover in the War of 1866 and then fought successfully at Kissingen and other places in Bavaria. In the Franco-German War, as commander of the Eighth Army Corps, he distinguished himself at Saarbrücken and Gravelotte and took part in the siege of Metz. In January, 1871, Goeben was appointed commander of the First Army Corps and fought a decisive battle at Saint-Quentin (January 19), when he defeated General Faidherbe and caused the disbanding of the French Army of the North. Besides the excellent account of his experiences in Spain, Goeben wrote valuable articles in military journals on the wars of 1866 and 1870–71. He was decorated with the Iron Cross and commanded at Coblentz until his death there, in 1880.

GOEDEKE, gẽ′de-ke, Karl (1814–87). A German historian of literature. He was born at Celle and was educated at Göttingen, where he was professor from 1873 until his death. He was a remarkably prolific author and, after writing several novels and the drama *König Kodrus, eine Missgeburt der Zeit,* under the pseudonym of Karl Stahl, devoted himself to critical and biographical literature. The long list of his publications includes: *Deutschlands Dichter von 1813 bis 1843* (1844); *Elf Bücher deutscher Dichtung von Sebastian Brant bis auf die Gegenwart* (1849); *Deutsche Dichtung im Mittelalter* (2d ed., 1871); and the monumental *Grundriss zur Geschichte der deutschen Dichtung* (3d ed., under the editorship of Edmund Goetze, 1910 et seq.), his principal work. His biographies of Lessing, Goethe, and Schiller are well known. Consult Schreck, *Karl Goedeke* (1894).

GOEHRE, gẽ′re, Paul (1864–). A German author and politician, born in Wurzen, Saxony, and educated at Leipzig and Berlin. He studied theology and was a Lutheran pastor at Schönbach, near Löbau, in 1888–90; then was a workman in Chemnitz; had charge of a church in Frankfort in 1894–97; and, after two years' work in the National Socialist party, in 1899 joined the Social Democrats. He was elected to the Reichstag in 1903, but resigned almost immediately, and was elected again in 1910. He wrote: *Drei Monate Fabrikarbeiter und Handwerksbursche* (1891), a great success, translated into English (1895), Norwegian, and Danish; *Die evangelische-soziale Bewegung* (1896; also translated into English; in 1891 he was general secretary of the Evangelical-Social Congress); *Wie ein Pfarrer Sozial-Demokrat wurde* (1900); *Die Kirche im 19. Jahrhundert* (1902); *Die Waarenhaus* (1907); *Der deutschen Arbeiter-Konsumverein* (1910); *Die sächsischen Volksschule und ihre Reform* (1911).

GOEJE, gōō′ye, Michael Jan de. See De Goeje.

GOEKINGK, gẽ′kėn̲k, Leopold Friedrich Günther von. See Göckingk.

GOERCKE, gẽr′ke, Johann (1750–1822). A German physician, born at Sorquitten, East Prussia. He entered the Prussian army as a surgeon at the age of 17 and in 1789 was appointed one of the three chief surgeons in the army. Meanwhile he had traveled extensively in Austria, Italy, France, and in England, where he entered into friendly relations with John and William Hunter, Bell, Cooper, Hamilton, and other equally celebrated surgeons. In 1797 he was appointed chief surgeon of the Prussian army, in which capacity he rendered invaluable services during the various campaigns terminating with the battle of Waterloo. He founded several educational institutions for military surgeons, the most important of which was the celebrated Pepinière, afterward known as the Medicinisch-Chirurgisches Friedrich-Wilhelms-Institut. His literary works include *Pharmacopœia Castrensis Borussiea* (1805) and *Beschreibung der Krankentransportmittel bei der königlichpreussischen Armee* (1814).

GOES, gōōs, or **TERGOES,** tĕr′gōōs. A seaport and market town of Holland, situated on the island of South Beveland, Province of Zeeland, about 3½ miles from its northern coast and 11 miles east of Middelburg (Map: Netherlands, B 3). The town has a fine Gothic church, a city hall, dating from 1442, with fine paintings, and the remains of an ancient castle of

Jacqueline of Bavaria. It has a harbor formed by a canal communicating with the East Scheldt, shipbuilding docks, and an active trade in hops, salt, and grain. It also has saw mills and establishments for bookbinding and cigar making. Pop., 1889, 6600; 1900, 6919; 1910, 7620.

GOES, gō′ȧsh, Benito de, or Bento de (1562–1606). A Portuguese traveler and Jesuit priest. He was born on the island of San Miguel, one of the Azores, and until his twenty-sixth year led the life of an adventurer in the East Indies. In 1588 he entered the Order of Jesus and in 1603 was sent on a mission to the Great Mogul and thence to Cathay. At the court of the Emperor Akbar he acquired an extensive knowledge of the geography of Asia, ascertaining after his arrival at Suchau (1605), on the Chinese frontier, that Cathay and China were identical. His interesting notes and observations were published after his death by the Italian Jesuit missionary Matteo Ricci. Many translations into German, French, and English were also made, one of them entitled *The Report of a Mahometan Merchant which had been in Cambalu, and the Travels of Bento de Goës . . . from Lahor to China by Land* (1625).

GOES, Damião de (1501–73). A Portuguese historian and diplomat, born at Alemquer (Estremadura). King John III of Portugal sent him on several important diplomatic missions to Flanders (1523), Poland (1529), Denmark and Sweden (1533). He then spent several years in Italy, engaged in philosophical and historical studies. At the siege of Louvain in Flanders by the French in 1542, Goes aided in the defense and saved the city from plunder, but was taken prisoner. He returned to Portugal in 1545 and three years afterward was placed in charge of the national archive, but his ideas were too advanced for the age. Suspected of Lutheranism, in 1572 he was condemned to imprisonment in the monastery at Batalha by the Inquisition and there died in obscurity. Among his works are: *Legatio Magni Imperatoris Presbyteri Joannis . . . de Indorum fide, ceremoniis, religione . . .* (1532); *Fides, religio, moresque Aetiopum sub imperio Pretiosi Joannis* (1541); *Commentarii Rerum Gestarum in India* (1539); *Hispania* (1542); *De Bello Cambraico Ultimo* (1549); *Chronica do felicissimo rei Dom Emmanuel* (1566–67); *Chronica do principe Dom Joam* (1567).

GOES, go͞os, Hugo van der. See Hugo van der Goes.

GOES, Jan Antonisz (Lat. form, Joannes Antonides) van der (1647–84). A Dutch poet, born at Rotterdam. Owing to the success of his first efforts at poetic composition, he found a patron in a wealthy gentleman of Flushing, who paid for his education at Utrecht, where he studied medicine. Afterward he became a member of the Admiralty at Rotterdam. Goes was a poet of considerable power and may in many respects be regarded as the last of the Dutch classics. He was very precocious, and before the age of 25 eulogies had already been written in his honor by Kaspar Brandt, Vollenhove, Huygens, Oudaen, Vondel, and other distinguished authors. One of his best productions is *Ystroom* (1671). The poem entitled *Bcllene aan Bant*, celebrating the peace between France and Holland, also occupies a high rank in Dutch literature. His collected poems appeared in 1685.

GOES, gō′ȧsh, Pedro de (1503–54). A Portuguese pioneer, born in Lisbon. In 1530 he went to Brazil with the expedition of Martim Affonso de Sousa and some years later was granted a strip of territory on the coast, where he first successfully introduced the cultivation of sugar cane. His plantation was subsequently destroyed by Indians, and Goes went to Portugal to secure the assistance of the King in suppressing the native uprisings. In 1548 he was appointed to assist the newly appointed Governor-General, Sousa, and, returning at once to Brazil, contributed greatly to the pacification of the country and the establishment of organized government. He is said to have been the first to bring specimens of the tobacco plant to Europe (1547).

GOESSMANN, gẽs′mȧn, Charles Anthony (1827–1910). An American chemist. He was born at Naumburg in Hesse and was educated at Göttingen, where he became assistant in the chemical laboratory and (1855) privatdocent. In 1857 he came to America, was chemist and superintendent of a Philadelphia sugar refinery until 1861, and then accepted a position with a Syracuse salt company. In 1869 he became professor of chemistry in the Massachusetts Agricultural College at Amherst, in 1873 chemist to the State Board of Agriculture, and in 1886 chemist to the State Board of Health. These three positions he held until his death. In 1887 he was president of the American Chemical Society. His writings include: *Chemical Composition of the Brines of Onondaga* (1862); *Best Mode of Manufacturing Coarse or Solar Salt from the Brines of Onondaga* (1863); *Salt Deposits of Petite Anse, La.* (1867); *Salt Resources of Goderich, Canada* (1868); *Manufacture of Sugar in Cuba* (1865).

GOETHALS, gō′thalz, George Washington (1858–). An American military and civil engineer, engineer in chief of the Panama Canal, and first Civil Governor of the Panama Canal Zone. He was born in Brooklyn, N. Y., and after studying in the College of the City of New York entered the United States Military Academy. Graduating in 1880, he was appointed second lieutenant in the Corps of Engineers. Through successive promotions he reached the grade of colonel in 1909, further advancement being proposed for him in 1914. During the Spanish-American War he was lieutenant colonel and chief of engineers of United States Volunteers. From 1885 to 1887 he served as assistant professor of military engineering at West Point. His early river and harbor work included the construction of the Mussel Shoals locks and dams on the Tennessee River. He was made a member of the board of fortification and in 1903 a member of the general staff.

In 1907, President Roosevelt having decided that all bids for the construction of the Panama Canal be rejected, and that, instead of leaving the work in charge of a civilian commission, the government should undertake the construction directly, Colonel Goethals was appointed chairman, as well as chief engineer, of a new commission, composed on its technical side of army and navy officers. An able engineer, familiar with conditions attending the prosecution of government work, and a man of force and resources, strong in personality and able to inspire confidence and energy in others, Colonel Goethals straightway developed a system by which the excavation of the canal and the many allied problems could be handled efficiently and effectively. The army engineers soon had the entire work of design and construction organized in harmony with the main general system, so that the actual construction could be undertaken at a rate not before realized—a rate which constantly improved with the progress of the work. Colonel Goethals, who regarded his work as that of an administrator rather than as that of an engineer, and who possessed a peculiar genius for detail, received ample executive powers. Largely through the exceedingly important services of Gen. William C. Gorgas (q.v.), the questions of sanitation, commissary, housing, and labor were all satisfactorily solved, and a complete social fabric as well as construction organization developed. The Panama Canal came to be known as a model of efficient labor and industrial contentment no less than as a piece of sound engineering. So vigorously was the work prosecuted that its virtual completion was possible in 1914, although the time scheduled had been June 1, 1915. Colonel Goethals received unstinted praise from visiting engineers and from the technical press of the entire civilized world. In 1913 the degree of LL.D. was conferred on him by the University of Pennsylvania, and in the spring of 1914 he was awarded medals by the National Geographic Society, the Civic Forum (New York), and the National Institute of Social Sciences. Late in 1913 and early in 1914 he was in demand for various administrative positions. He declined the police commissionership of New York City, offered him by Mayor Mitchel, and the "city managership" of Dayton, Ohio. On Feb. 3, 1914, he was appointed by President Wilson the first Civil Governor of the Panama Canal Zone. See PANAMA CANAL.

GOETHE, gẽ′te, AUGUST VON (1789–1830). The son of Johann Wolfgang von Goethe (q.v.). He was born at Weimar and occupied the position of chamberlain to the Grand Duke of Saxe-Weimar. He died Oct. 27, 1830, while visiting Rome. By his marriage with the Baroness Ottilie von Pogswisch, a highly accomplished woman, he had three children, of whom WALTHER WOLFGANG (1818–85) was known as a composer of operettas and songs, while his younger brother, WOLFGANG MAXIMILIAN (1820–83), was a jurist and poet. The third, ALMA VON GOETHE (1827–44), died in Vienna. These three grandchildren of the great poet left no offspring.

GOETHE, JOHANN WOLFGANG VON (1749–1832). The greatest German writer and one of the greatest of the world, excelling in every literary genre, distinguished in many branches of science and in literary and artistic criticism. He was born in Frankfort-on-the-Main, Aug. 28, 1749. Both his parentage and the place of his birth were significant for his future development. He was among the first of German literary men since the Meistersinger days to spring from a commercial environment and parents closely affiliated with political life in what remained of the old free cities. His father's father was a tailor and innkeeper. His father received a good education, traveled in Italy, attained the distinction of Imperial councilor, and, though never wealthy, was always in easy circumstances. He married (1748) Katherine Elisabeth Textor, and Goethe was the first of their four children, of whom only himself and a sister, Cornelia, survived childhood.

In the pages of Goethe's brilliant autobiographical *Dichtung und Wahrheit* we seldom see his father unbend from his philistine self-satisfaction. But the mother must have been a very remarkable woman, simple, hearty, joyous, affectionate, not highly educated, but with a faculty of rapid assimilation that made her no unworthy companion or correspondent of persons of deeper culture or higher station. The relation of mother and child was ideal. His childhood and youth owed more to her direct influence than to all else besides. She died in 1808. Her *Letters* are published by the Goethe Society (1894). Consult Heinemann, *Goethes Mutter* (6th ed., Leipzig, 1900).

But Frankfort, too, had a molding influence on him. It was a commercial city, then even more than now one of the great centres of German financial life. Old and new in turn and together left their impress on the brilliant and receptive boy. He was precocious, knew something at eight of Greek, Latin, French, and Italian, had acquired from his mother a knack of story-telling and from a toy puppet show in his nursery a taste for the stage and a stimulus to imagination on which his autobiography lays much stress. He never went regularly to school and as a child showed consciousness of superiority. The French occupation of Frankfort in 1759 served to polish his French and still further to cultivate his interest in the stage. He continued to study books and men at Frankfort till he was 16, and had had one love affair, from which he of course recovered with the facile mobility of youth before he went to Leipzig to study law and be fascinated by his host's daughter, Kätchen Schönkopf.

Leipzig in 1765 was a "little Paris" in its social and literary ideals. Goethe's letters show that he quickly caught a spirit that accorded well with his nature. He studied little, wrote love songs, interested himself critically in art, learned far more about life than about law, and lost his health. By 1768 he had come to look at life on its seamy side, and showed his disillusionment in a drama, *Die Mitschuldigen*, where vice and meanness in manifold variety find it convenient to forgive and forget. This was completed later in Frankfort. Another drama, *Die Laune des Verliebten*, begun in Leipzig, is an embellished version of his relation to Kätchen. It was his author's instinct to put into literary form every experience. All his works, he says, are confessions of his life. These two youthful dramatic essays, both in their matter and their form, show Goethe as a realist. He idealized neither the world nor individual characters.

Goethe returned ill to Frankfort in the autumn of 1768. He remained there sick or convalescent till April, 1770, gaining the while from the works of Lessing a sharpened æsthetic sense and a more balanced judgment. Here, too, he began the scientific studies that were later to round out his fame, and from an amiable acquaintance, Fräulein von Klettenberg, the "Beautiful Soul" of his *Wilhelm Meister*, he gained some insight into the phenomena of pietistic religious experience and became interested in alchemy and kindred lore, all of which proved useful for *Faust*.

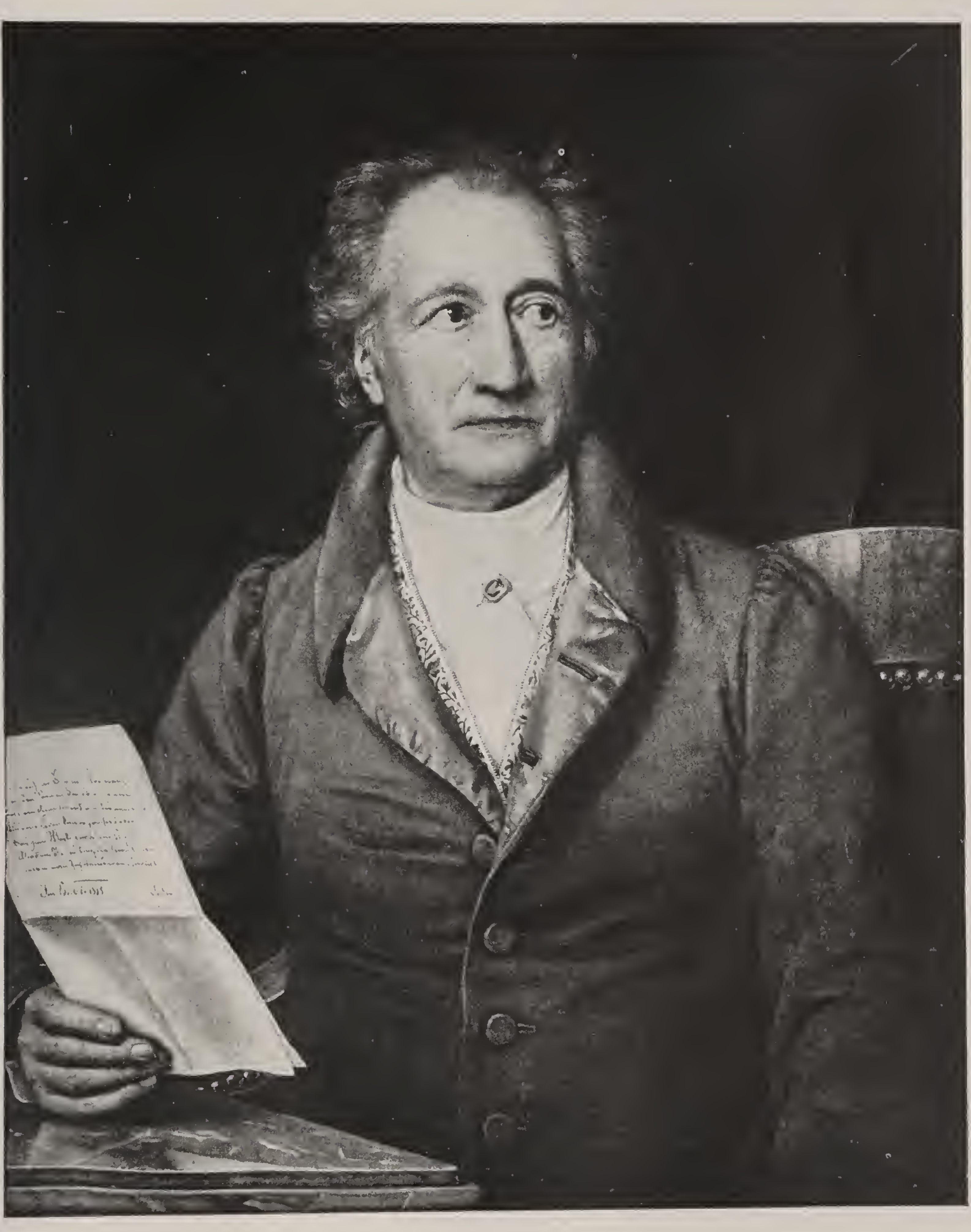
With health restored Goethe went to Strassburg to continue his legal studies. This city, French in government and institutions, German in people and spirit, was a good place in which to complete a cosmopolitan training. Goethe set himself earnestly to work to pass his preliminary examinations and to learn to dance. He studied also music, art, anatomy, and chemistry. He had begun to work on his dissertation when, in September (1770) he met Herder (q.v.) and in October made the acquaintance of Friederike Brion (q.v.) the winning daughter of a pastor of Sesenheim. He loved her and let her love him till her visit to Strassburg somewhat dulled the idyllic illusion. He would not, perhaps he felt he ought not, fetter his fortunes and his genius to any yoke. He left Strassburg (August, 1771), carrying with him a sore heart and a sense of wrong to be atoned. Similar situations haunt his literary work of the next years. The Marie of *Götz*, the Marie of *Clavigo*, the Clärchen of *Egmont*, the Gretchen of *Faust*, spring from this experience, of which he has left a charming and rather objective account in his autobiographic *Dichtung und Wahrheit*. Friederike died unmarried in 1813. They saw each other without strong emotion on either side in 1779.

Meantime Goethe had formed a close intimacy with Herder, who was confined for months to his room through an operation on the eyes. This was hardly less important to Goethe's literary development than the love affair at Sesenheim. They read literary masterpieces and talked of them. Goethe learned through Herder to distrust French classical canons, to appreciate Shakespeare, and to realize that all poetic development must be based on national character if it is to be enduring or beneficent. It was Herder, too, who brought Goethe under the influence of Rousseau, an influence apparent in *Götz*, and especially in *Die Leiden des jungen Werthers*. Herder's influence was inspiring, even when it was merely restraining, for Goethe was already meditating his *Götz* and even his *Faust*, and both profited by a maturing delay. But Herder finished his work for Goethe at Strassburg. When they met again (1776), Goethe felt he had little to gain, and presently it was he who repaid the old debt.

Goethe with his licentiate's degree went back to Frankfort (1771) and began the nominal practice of law, contributing critical notices to the press and working on *Götz*, which he intended for a more daring proclamation of the newly claimed liberties of the German stage than Lessing, who had won them, would have ventured or approved. It was the trumpet call of the decade of Storm and Stress (q.v.), in which German young blood held high carnival, and in a blind following of Shakespeare naturally showed more of his faults than of his spirit. *Götz* was a dramatic adaptation of the autobiography of a robber knight of the sixteenth century, striking in its local color and naïveté. In his sturdy independence Goethe saw foreshadowed the reassertion of individualism in the eighteenth century, and he made Götz, far more than that knight had made himself, typical of the national revolt against the Roman law and church and the centralization of authority. For to Goethe at this time the only progress practicable for Germany lay in the stressing of individuality. But the play as written in 1771 proved too lawless even for his youthful taste. The first sketch was completed in 1771 and remains a curious monument of a period of ferment. It appeared much modified in 1773, struck an answering chord in every heart, and made its as yet unnamed author the literary leader of his time. It gave an immense stimulus to dramatic production, though in casting all thought of the unities to the winds Lessing thought the "captivating monstrosity" retarded the development of dramatic art. Goethe may have thought so, too; for he subjected it to a radical revision many years later (1804) for the Weimar stage.

This was a period of manifold activity. To it belong some fine songs, among them the *Wanderers Sturmlied*, orations, essays, reviews, and minor work in large quantity, to which he was stimulated by the shrewd and cautious criticism of Merck, an army paymaster at Darmstadt, some of whose traits Goethe used for Mephistopheles. This production was interrupted by a new experience. In 1772 Goethe went to Wetzlar to practice law and fell in love with Charlotte Buff (Lotte), the betrothed of his friend Kestner. From the rather delicate situation thus created Goethe suddenly withdrew (Sept. 11, 1772), and on his way back to Frankfort managed to find heart for a flirtation with Maximiliane von Laroche, who afterward became the mother of one of his last adorers, Bettina von Arnim-Brentano. Literary expression he gave to his Wetzlar experiences in *Die Leiden des jungen Werthers*, which revealed powers in the German tongue till then unimagined and still unsurpassed. The story, which has been often translated into many languages, is sentimentally morbid and typical of its generation. It was suggested by the suicide of Jerusalem, a student who had formed an attachment for a friend's wife, similar to Goethe's for Lotte. But Goethe, having expressed the mood of his time and age, quickly recovered from it to enter on a period of great creative fecundity, the fruits of which were to appear later in *Faust*, *Prometheus*, *Egmont*, and *Stella*, as well as in many lyrics. Then came his passing betrothal to Lili Schönemann (died 1817), a banker's daughter, the nearest Goethe ever came to a love match. For her he wrote some very beautiful songs, and he cherished her memory till death. But for the time they drew apart (September, 1775), and soon after Goethe was invited by Karl August to be one of his court at Weimar. Meantime Goethe had written *Clavigo* (1774) and many slighter pieces, among them *Götter, Helden und Wieland*, and had found in Merck a friend and a caustically discriminating critic, of much value to him in the discipline of genius. His relations to Lili found expression a little later in *Stella* (1776). In May, 1775, he had made a journey to Switzerland with his friends the counts Stolberg, and there became intimate with Lavater, whom he had already met.

The coming of Goethe to Weimar (November, 1775) is a turning point in the literary life of Germany. From 1776 Goethe's influence begins to be paramount wherever German is spoken. Weimar was already beginning to be what it has remained till now, a pleasant residence for the cultured. Goethe made it the Athens of Germany, aided by Karl August and his mother, Amalie, hindered at first by Karl's prim wife, Luise, and by a jealous group of court officials. Goethe was received in Weimar with an effervescence of enthusiastic appreciation. For a time he and his Prince led the court a frolic dance, but presently he settled down to be a prudent and blameless man of affairs and found in this courtly life and the intimate contact with aristocratic society much to widen his mind and give his judgment a balanced calm. For the next 10 years (1776–86) he wrote little save



GOETHE

FROM THE PORTRAIT BY CARL STIELER IN THE NEW PINAKOTHEK AT MUNICH

occasional verses and dramatic trifles, of which the chief is *Die Geschwister*. He began work on *Wilhelm Meister* in 1777. Study of natural science, mineralogy, geology, osteology, intercourse with Herder, Wieland, and others, and his interest in the mines at Ilmenau, claimed his time, and he made a journey to the mining district of the Harz on their account, bringing back impressions that were of use, not only at Ilmenau, but for his *Faust*. He managed the Court Theatre (with some intermissions, till 1817) and the War Department, superintended the roads and bridges, accompanied Karl August on a journey to Switzerland, from which he gathered literary impressions, and above all he maintained a correspondence and intercourse with Charlotte von Stein, a remarkable woman, 33 years old and the mother of seven children, who, in making his life "an enduring resignation," gave his nature more refinement and self-control for the days of his emancipation. For when he had learned from her what she had to teach, he began to chafe both at this relation and at his court life, until in 1786 he asked of Karl August unlimited leave of absence, that he might visit Italy. The literary product of this decade is almost wholly lyric or epigrammatic; but he carried across the Alps the uncompleted *Iphigenie* (which in a prose form had been acted in 1779), *Egmont*, *Tasso*, and *Faust*—works not to be finished in the spirit of their inception.

For the Italian journey marks a most important epoch of Goethe's literary and moral development. All the work that follows is quite different from all that went before. Here Goethe found at last his moral balance. From 1788 till his death he went his way among men with the serenity of perfect self-possession. He went first to Verona, then to Padua and Venice, where he stayed two weeks, and then turned southward to Ferrara and across the Apennines to Florence, where he lingered but three hours, so eager was the impetuous traveler to see Rome (Oct. 29, 1786). Here the poetic stream that had long flowed so scantily was unsealed. By mid-January, 1787, he had turned *Iphigenie* into classic iambics, as a first fruit of the new influences, and was so sure that he was on the right track that he determined to do the same service for *Tasso* on a journey to Naples and Sicily, from which he returned in June.

In Rome he now remained nearly a year, perfecting *Iphigenie*, finishing *Egmont*, working on *Tasso* and *Faust*, and prosecuting zealously artistic and botanical studies. He also lived connubially with a Roman girl, and the connection seems to have revealed to him a joy of life dissociated from the somewhat morbid sentimentality that had characterized his previous relations, especially that with Charlotte von Stein. This new moral attitude is reflected in the *Römische Elegien* (1788), an epithalamium addressed to Christiane Vulpius, a young woman of Weimar, with whom he lived quasi-maritally from 1788 till their marriage in 1806, and afterward till her death (1816), to his own satisfaction, but to the scandal of the ladies of Weimar and the vexation of Bettina von Arnim-Brentano. According to Goethe's correspondence with Christiane, but recently published (*Goethe-Gesellschaft*, Weimar), she was the true and faithful companion of his after life, loving and beloved. His mother treated her from the first as "her daughter," and she earned, after the battle of Jena, the honor of a public recognition of her place by preserving, at the risk of her life, Goethe's house from French marauders.

Goethe brought to Weimar (June 18, 1788) *Iphigenie* and *Egmont*, with *Tasso* almost in its present form, and an essentially altered conception of *Faust*. *Iphigenie* was planned in 1776 and written in prose in 1779. It was a literary projection of his relation to Charlotte von Stein. Orestes recovers a clear mind in the angelic presence of his sister, as Goethe imagined he would do if Charlotte would "be a sister" to him. Such ethics were unripe and unnatural, and the play lacks action. It was old work made over, and its exquisite versification did not wholly suffice to make it harmonize with his new spirit. There is the same discord of old and new in the prose drama *Egmont*, "the weak, aristocratic twin brother of *Götz*" (Hermann Grimm). *Tasso* has more unity of conception and execution, though it is deficient in dramatic action, and, indeed, was not put on the stage for 18 years after its publication (1790). It, too, in its pre-Italian prose form (1780–81) reflected Goethe "caught in the snare" of Charlotte von Stein, a situation that in 1786 had ceased to have living interest for him. He concentrated his thought on its form, and made the iambics of *Tasso* so perfect that Schlegel said their very beauty made them unsuited to dramatic dialogue. He also changed the close to conform to his new ethical position.

Goethe's first homogeneous work after his return from Italy was the *Römische Elegien*, in the spirit, he said, of Tibullus, Catullus, and Propertius, the most antique in thought of modern German verse. The frankly naïve sensualism that they exhibited, borne out by his conduct, caused Goethe a temporary loss of social popularity in the "imperfectly monogamous" society of Weimar, as well as a breach with Frau von Stein. He had outgrown her and the Weimar circle. Even his literary preëminence seemed to wane. In *Götz* and *Werther* he had led his countrymen. Now he had passed beyond them in his deepened æsthetic insight. For a time and until rejuvenated by the friendship of Schiller, he gave his time largely to scientific studies, to which he brought not only an original mind, but almost a seer's vision. In 1784 he had discovered the intermaxillary bone by a method that foreshadowed the science of comparative anatomy. In his essay *Die Metamorphose der Pflanzen*, he became, says Esenbeck, "the tender father" of a just-born science; his experiments in optics were ingenious and valuable, though his theory of colors was false, and he was first to perceive the vertebrate character of the human skull. Thus, while his contemporary botanists and anatomists were wandering aimlessly or making dry registration of facts, he gave them ideas whose fruitfulness is not yet exhausted. From these studies Goethe was won back to literature by the friendship of Schiller.

Schiller had been living in or near Weimar since 1787, but a strange irony of destiny kept the poets estranged till 1794, though Schiller was drawing, unperceived, into closer sympathy with Goethe's classic ideals. Meantime Goethe's son August was born (Dec. 25, 1789), the only one of several children to reach maturity. This and the storm clouds of the French Revolution led him to defer a visit to Italy, though in 1790 he went to Venice to meet the Duchess Amalie there, and wrote a group of *Venetianische Epi-*

gramme, that show how his quasi marriage had helped him to a calmer judgment of Italian culture than that of the *Elegies*. Work in lighter vein now attracted him, *Wilhelm Meister* and the Court Theatre (the management of which he undertook in 1791), till in the summer of 1792 he was summoned by Karl August to join him in the invasion of France that was to culminate in the defeat of the Duke of Brunswick at Valmy. Goethe recorded his six weeks' impressions in his *Kampagne in Frankreich* and returned to Weimar to find almost ready for his occupancy a mansion presented to him by the Duke and now, as the home of the Goethe Society and its museum, inseparably connected with his name. The pleasure of this enlarged domesticity is reflected in *Reineke Fuchs*, written in 1793 and published in 1794—the adaptation to social satire of an animal fable that can be traced back to Æsop and to India, though Goethe's immediate model was a German rendering of the mediæval Flemish version of the fable by a certain Willem (about 1250). Out of this comic epic he made, without local or personal illusions, a social and political satire full of ease and vigor, a humorous apotheosis of impudence that has become and is likely to remain one of his most popular poems, though at the time it passed almost unnoticed.

Goethe had met Schiller on several occasions since 1779 and had secured for him a professorship at Jena, though it had seemed to him that the author of *Die Räuber* stood in the way of development of classical taste which, since his return from Italy, Goethe had been desirous to foster. But Schiller was himself developing along these lines, and when they came to understand one another, in 1794, Goethe may well have felt that Schiller, more than any other in Germany, was fitted to appreciate and aid him. He was first to speak of friendship, first to visit his new-found friend. Their intercourse grew constant, especially after Schiller came to Weimar (1799), and was interrupted only by Schiller's death (1805). To Goethe the relation was of stimulating rather than of directing force. He contributed to Schiller's periodical *Die Horen* (1795–97) the *Unterhaltungen deutscher Ausgewanderten* and the *Römische Elegien*, and to the *Musenalmanach* (1796–1800) his share of the *Xenien*—couplets of stinging literary criticism that aroused great excitement and lifelong enmities.

Under this new influence *Wilhelm Meisters Lehrjahre* (1795) was completed—a novel with no definite plot, its purpose being the unfolding of characters drawn from varied social spheres, wonderfully realistic studies involving much ripened worldly wisdom and philosophy. Mignon and Philine are enduring creations, the songs interspersed in the novel are among the most exquisite in any literature, and the analysis of *Hamlet* is a very acute criticism. Some fine ballads and elegies belong to this period also, and it closes with that hymn to the family and masterpiece of classic realism, *Hermann und Dorothea* (1797). Here all is studied from life; there is no idealization, no sentimentality. It was an old story, but instinct with a conservative patriotism in these years of revolution and social upheaval. Other less important works of this period are a realistic drama, *Die natürliche Tochter*, held in higher esteem by more recent critics, and *Achilleïs*, an attempt to continue the *Iliad*. Some work was done on *Faust* also; but sickness and public cares interrupted it, and the first part was not published till it was included in the first edition of Goethe's *Works* (13 vols., 1808).

Meantime Goethe had lost many friends—Gleim, Klopstock, and Herder in 1803, Schiller in 1805, his mother in 1808. In that year Goethe came in frequent contact with Napoleon at Erfurt. It was about this time, too, that Bettina von Arnim-Brentano conceived that violent attachment for him that appears in her *Goethes Briefwechsel mit einem Kinde*, which, however, does not represent an actual correspondence; but Bettina could not endure Christiane, and the acquaintance ceased after 1811. In 1809 Goethe published his second novel, *Die Wahlverwandtschaften*, a story of the conflict of love and conjugal duty, with a tragic close. Though now little read, its influence has been great, for it is the starting point of German psychologic fiction. It has also an autobiographical value. Charlotte is Frau von Stein, and Edward is what Goethe felt he might have become. Ottilie has been thought by some, probably wrongly, to be studied from a young Jena girl, Minna Herzlieb.

From 1811 to 1814 appeared the first three parts of *Dichtung und Wahrheit*, one of the most fascinating autobiographies in any language. It is early memories seen through a long vista of years and under the transforming influence of an artist's eye, beginning with infancy and closing with his coming to Weimar. Meantime the War of Liberation had restored national independence to Germany; but while the fate of his country was changing before his eyes, Goethe was studying the Oriental poets and checking the effect of their exuberance by renewed reading of Homer. It was in these years that he wrote in great part the *West-östlicher Divan* (1819), foreign in externals, mysterious and oracular in parts, but aiming to cultivate international sympathies, social and literary, in years of intense chauvinism. The Zuleika poems in the *Divan* have been thought to be addressed in gracefully platonic affection to Marianne Willemer, wife of his congenial host on a journey to the Rhine in 1815, but this is very doubtful. He also undertook at this time some antiquarian studies, standing intentionally aloof from the temporal aspirations of the German people that he might labor more effectively for their intellectual uplifting.

The *West-östlicher Divan* is the last work of Goethe's long connubial life. Christiane had died in 1816. He felt the blow severely and said that what remained of life to him was but time granted "that he might mourn her loss." His directorship of the Weimar Theatre he gave up in 1817. But the years that remained to him, "testamentary years," he called them, were to yield much of interest. *Wilhelm Meisters Wanderjahre* may indeed seem dreary reading, though it contains many wise pedagogical observations and some episodes that recall the narrative power of Goethe's prime. To these years, also, we owe the Second Part of *Faust*, the necessary complement of the former, with its teaching that men rise by unselfish altruistic effort. Here, as Scherer noticed, Faust chooses, not wealth, but work, and finds in that choice his salvation. Mediately Gretchen brings him to the choice; immediately Helena, the incarnation of Greek ideals, as though to suggest that beauty is positive, creative, revealing the worth of life, and freeing Faust at last from the Mephistophelean spirit of negation. So the teaching is the same as that of *Wilhelm Meister.* The scholar, as the poet, passes, in Goethe's conception, from a groping, contemplative, searching æsthetic existence under the spur of negative spirits and ideal models, to active, useful labor. Here is to be found Goethe's philosophy of life, which aims to realize the ideal by the idealization of the real, to correlate action with thought. "The rest of my life may be regarded as a free gift," he said as he sealed the manuscript of this Second Part of *Faust.* "It is now really indifferent what I do, or if I do anything at all." It was his philosophic testament to Germany.

It is to this last period, too, that we owe the Conversations (*Gespräche*) with Eckermann, which have preserved to us much keen criticism of men and things, for during these declining years he continued to be in closest touch with the intellectual movement of his own country and of others. Weimar became a goal of pilgrimage to men of many minds and nations. He seemed to Germans the survivor, almost the last, of a heroic age. Some of these visitors give us glimpses of the old man's life, among them Heine, Thackeray, and his old friend Lotte Kestner. After his wife's death he traveled but little, seldom farther than Jena, lingering especially over places associated with his prime, and towards the last working intermittently, as health permitted, on the annals of his Weimar life. In 1828 Karl August died, followed two years later by Goethe's son August, whose widow, Ottilie, cared for her father-in-law to the end. In the same year (1830) Grand Duchess Luise passed away. So Goethe was left, almost the last of his generation. He died in Weimar March 22, 1832, in his chair, so peacefully that men did not know the hour. Eckermann, who saw his body as it was prepared for burial, noted the deep peace and firmness of the features, the magnificence of the limbs, the broad, strong, and arched chest. Nowhere on the body, he says, was there a trace of wasting. "A perfect man lay in great beauty before me." This body lies now, with that of Schiller, in the ducal mausoleum of Weimar in front of the bronze coffins of the two princely patrons of both, Luise and Karl August.

This is the most completely rounded literary life in history—a life of monumental proportion and yet of perfect symmetry, responsive to all intellectual impulses of art, philosophy, and science, open to every light, yet self-poised and self-controlled till its calm seems Olympian. Goethe is at once the representative and the prophet of the modern spirit, reconciling the antinomies of the ideal and the real in the world wisdom of his *Faust.*

The literature that has gathered around Goethe would fill a library—indeed, it does so in the Goethe archives at Weimar, whence issues the great edition of his works, embracing also the *Tagebücher* and *Briefe,* now all but complete. The *Goethe-Jahrbuch* (annual) is devoted entirely to Goethe. An exhaustive bibliography of Goethe literature is to be found in Goedeke, *Grundriss zur Geschichte der deutschen Dichtung,* vol. iv (3d ed., 1910–). Recent comprehensive editions are those of Heinemann (Leipzig, 1900–), the *Jubilaeums-Ausgabe* (Stuttgart, 1907–), the *Wilhelm Ernst-Ausgabe* (Leipzig, 1908–), the *Propylaeen-Ausgabe* (Munich, 1909–), the *Tempel-Klassiker-Ausgabe* (Leipzig, 1909–), the new *Hempel-Ausgabe* (Berlin, 1910–). Of the letters there are selections by Von der Hellen (Stuttgart, 1900–), Stein (Berlin, 1902–), Richard M. Meyer (Berlin, 1909–). The correspondence with Schiller is best edited by Graef and Leitzmann (Leipzig, 1912–), that with Frau von Stein by Fraenkel (Jena, 1908). Von Biedermann has edited Goethe's *Gespräche* (10 vols., 2d ed., Leipzig, 1909–); Houben has edited his *Gespräche mit Eckermann* (8th ed., Leipzig, 1909).

Of the lives of Goethe, Düntzer's (Leipzig, 1883) is the most complete (also in Eng. trans.). Excellent popular biographies are those by Heinemann (3d ed., 2 vols., Leipzig, 1903); Bielschowsky (25th ed., Munich, 1913; trans. by Cooper, New York, 1905–08); and Witkowsky (2d ed., Leipzig, 1913). Lewes's well-known life is largely superseded by these German works. Another biography in English, by Atkins, appeared in 1904 (London).

Among the later studies of Goethe, omitting all treatises on special works, the most significant are: Weissenfels, *Der junge Goethe* (Tübingen, 1899); Menzel, *Der Frankfurter Goethe* (Frankfurt, 1900); Scherer, *Aufsätze über Goethe* (2d ed., Berlin, 1900); Graefe, *Goethe über seine Dichtungen* (Frankfurt, 1901–); Bode, *Goethes Aesthetik* (Berlin, 1901); Vogel, *Goethes Selbstzeugnisse über seine Stellung zur Religion* (3d ed., Leipzig, 1903); Hermann Grimm, *Goethe-Vorlesungen* (7th ed., Stuttgart, 1903); Wasielewski, *Goethe und die Descendenzlehre* (Frankfurt, 1903); Richard M. Meyer, *Goethe* (3d ed., Berlin, 1905); Ludwig Geiger, *Goethe und die Seinen* (Leipzig, 1908); Vogel, *Goethes Studenten-Jahre* (3d ed., Leipzig, 1909); Diezmann, *Goethe und die lustige Zeit in Weimar* (4th ed., Weimar, 1909); Bernays, *Der junge Goethe* (new ed., Leipzig, 1909–12); Houston Stewart Chamberlain, *Goethe* (Munich, 1912; in German); Maass, *Goethe und die Antike* (Stuttgart, 1912).

GOETHE, KATHARINA ELISABETH, known as "Frau Rat" and "Frau Aja" (1731–1808). The mother of Johann Wolfgang von Goethe. She was born at Frankfort on the Main and was a daughter of Johann Wolfgang Textor, a prominent citizen of that city. At the age of 17 she was married to Johann Kaspar Goethe, by whom she had four children. She was a woman of exceptional intellect, marked individuality, and a delightfully joyous cast of mind, as evidenced by her letters, and in the frequent references to her found in the works of her son, upon whose intellectual development she undoubtedly exerted a remarkable influence. She was made the heroine of the work by Bettina von Arnim entitled *Dies Buch gehört dem König* (1843) and is one of the central figures of Gutzkow's famous play, *Der Königsleutnant.* Much of the correspondence of Katharina Elisabeth Goethe has been published in *Goethe's Mother, Correspondence of Catharine Elizabeth Goethe with Goethe* (Leipzig, 1889). Her letters to the Duchess Anna Amalia were published at Weimar in 1885. Consult: Keil, *Frau Rat* (Leipzig, 1871); Erich Schmidt, *Charakteristiken* (Berlin, 1886); Heinemann, *Goethes Mutter* (7th ed., Leipzig, 1904).

GOETHITE, gẽ′tīt (named in honor of Goethe). A hydrated iron peroxide that crystallizes in the orthorhombic system, producing slender prisms which pass by gradations into crystalline aggregates and massive forms. The lustre is adamantine and the color yellow red to brown. It occurs with other iron oxides, especially hematite or limonite, in Nassau, Saxony, and elsewhere in Germany; at various localities in England; and in the United States in the Lake Superior region, Missouri, Colorado, California, and elsewhere. Goethite is sometimes found penetrating quartz, like rutile, forming sagenite or "Venus's hair stone," which, when cut, is used for seals and charms in jewelry.

GOETSCHIUS, gĕ'chŭs, Percy (1853–). A distinguished American musical scholar, writer, and composer, born in Paterson, N. J. A graduate of the Stuttgart Conservatory of Music, he was in 1876 placed in charge of the English classes there and in 1885 was made royal professor. He at the same time contributed to the leading musical journals of Germany. He was called to Syracuse (N. Y.) University in 1890, as professor of harmony, musical history, and advanced pianoforte playing. In 1892–96 he had charge of the composition branch of the New England Conservatory. He was appointed organist of the First Parish Church of Brookline in 1897. In 1905 he became head of the theory department at the Institute of Musical Art in New York. His principal works are: *The Material Used in Musical Composition* (1882); *The Theory and Practice of Tone Relations* (1892); *Models of the Principal Musical Forms* (1895); *Syllabus of Musical History* (1895); *The Homophonic Forms of Musical Composition* (1898); *Exercises in Melody-Writing* (1900); *Applied Counterpoint* (1902); *Lessons in Music-Form* (1904); *Exercises in Elementary Counterpoint* (1909).

GOETZ, gĕts, (Leopold) Karl (1868–). A German Old Catholic theologian and historian, born in Karlsruhe and educated at Bonn and Bern. In 1892–1900 he was priest of the Old Catholic Congregation at Passau, for two years was professor in the theological seminary of that denomination at Bonn, and in 1902 became professor in the University of Bonn. His works on Church history, especially as it touched the points in controversy between Rome and the Old Catholics, and on early Russian history, include the following: *Busslehre Cyprians* (1895); *Geschichtliche Stellung und Aufgabe des deutschen Altkatholizismus* (1895–96); *Geschichte der Slavenapostel Konstantinus und Methodius* (1897); *Lazaristen und Jesuiten* (1898); *Leo XIII* (1899); *F. H. Reusch* (1901); *Das Kiever Höhlenkloster als Kulturzentrum der vormongolischen Russlands* (1904); *Kirchenrechtliche und kulturgeschichtliche Denkmäler Altrusslands* (1905); *Staat und Kirche in Altrussland* (1908); and a great work on Russian law, vols. i–iv (1910–13).

GOETZ, gĕts, Theodor von (1826–92). A German battle painter, born in Lieschen, Silesia. He studied at first under the genre painter Hantzsch in Dresden, but turned later to military subjects. He is particularly noteworthy for his faithful representations of the events of the Franco-German War of 1870–71, in which he took part as commander of a battalion of riflemen. His pictures are faithful in detail, but hard in color. The best known include: "Episode in Battle of Sedan" (1875); "Prince George of Saxony in Battle of Saint-Privat" (1876); and "Crown Prince Albert after the Battle of Beaumont Congratulated by Prince George" (1887, Dresden Gallery).

GOETZ, or **GÖTZ, VON BERLICHINGEN**, gĕts fŏn bĕr'lĭk-ĭng'en. See Berlichingen.

GOETZE, gĕt'ze, Frederick Arthur (1870–). An American mechanical engineer and educator. He was born in Jersey City, N. J., and was educated at Stevens Preparatory School (1882–85), at Cooper Union, New York (1885–87), and at the Columbia School of Mines (1893–95). From 1895 to 1907 he was assistant superintendent and superintendent of buildings and grounds of Columbia University, where he became dean of the schools of Mines, Engineering, and Chemistry, consulting engineer in 1907, and controller in 1913.

GOEZE, gĕ'tse, Johann August Ephraim (1731–93). A German theologian and naturalist, a brother of Johann Melchior Goeze. He was born at Aschersleben and studied theology at the University of Halle (1747–51). After occupying several pastorates he became deacon of the cathedral at Quedlinburg, where he died. He is best known for his researches in natural history. His microscopical investigations led to the publication of the important work entitled *Versuch einer Naturgeschichte der Eingeweidewürmer tierischer Körper* (1782; appendix, 1800). In 1773–74 he prepared about 75 translations of Bonnet's treatises on the natural history of insects.

GOEZE, Johann Melchior (1717–86). A German Lutheran clergyman, born at Halberstadt (Province of Saxony, Prussia). Educated at Jena and Halle, he became pastor of the church of the Holy Spirit at Magdeburg in 1750, and in 1755 chief pastor of St. Catharine's Church at Hamburg. From 1760 to 1770 he held the seniority of the Lutheran clergy at Hamburg. He is known chiefly as a tireless controversialist, and in particular for his attacks on Lessing because of the latter's publication, in the "Wolfenbüttel Fragments," of the posthumous *Fragmente eines Ungenannten* (1774, 1777, 1778) of the freethinker Hermann Reimarus. He began the well-known contest in 1777, with an essay in Nos. 55 and 56 of the *Freiwillige Beiträge zu den Hamburgischen Nachrichten*, which he followed by *Etwas Vorläufiges gegen des Herrn Hofrath Lessings mittelbare und unmittelbare feindselige Angriffe* (1778), and *Lessings Schwächen* (1778), all acrid and personal. Lessing made his chief reply in 1778 in *Eine Duplik, Eine Parabel, Axiomata* and *Anti-Goeze*, among both the keenest of his writings and the foremost examples of the literature of the class. The pastor had little of the incisive thought, and yet less of the skillful expression, of his opponent. He was intolerant, even for the time, and a stickler for a narrowly literalistic interpretation of the Scriptures. His polemics against Lessing were edited by E. Schmidt in 1893. Consult his life by Röpe (Hamburg, 1860), and Cropp, "Lessings Streit mit Hauptpastor Goeze," in Heft 155 of the *Deutsche Zeit- und Streit-Fragen* (Berlin, 1881). See Lessing.

GOFF, John W. (c.1852–). An American lawyer and judge. He was born at Wexford, Ireland, went to the United States at an early age, and was educated at Cooper Union, New York City. He studied law and in 1870 was admitted to the bar. From 1888 to 1891 he was assistant district attorney of New York City; later he attracted attention as counsel for the

Law Association in the investigation and prosecution of election frauds in New York and as counsel for the Lexow Senatorial Committee which investigated police administration in the same city. From 1894 to 1906 he was recorder of the city of New York, and he was elected justice of the Supreme Court of New York, first district, for the term of 1907 to 1920. In 1912 he presided over two of the most famous criminal trials ever held in New York—the first trial of Charles Becker, former police lieutenant, who was convicted of instigating the murder of the gambler Herman Rosenthal, and the trial of the four gunmen convicted of the actual shooting.

GOFF, Nathan (1843–). An American legislator, born at Clarksburg, W. Va. He was educated at Georgetown College and at the University of the City of New York, and from 1861 to 1865 served in the Union army, rising from the rank of lieutenant to major. Admitted to the bar in 1866, he then was (Republican) member of the West Virginia House of Representatives in 1867, United States district attorney in 1868–81, Secretary of the Navy under President Hayes in 1881, again United States district attorney in 1881–82, and member of Congress (1883–89). In 1888 his election as Governor of West Virginia was successfully contested by his Democratic opponent. He served as United States circuit judge from 1892 to 1911 and as judge of the United States Circuit Court of Appeals in 1912–13, and was elected United States Senator for the term of 1913–19.

GOFFE, gŏf, William (?–c.1680). An English regicide, born in Sussex, where his father was the rector of a church at Stammer. Apprenticed to a salter in London, he embraced the cause of the Parliament against Charles I and in 1645 was commissioned a captain in the New Model army, in which by his zeal and bravery he won rapid promotion. He was one of the judges at the trial of Charles I and signed the death warrant. He commanded Cromwell's old regiment at the battle of Dunbar and distinguished himself at Worcester. He was elected to Parliament in 1654 and was promoted major general in 1655, with command in Sussex, Berkshire, and Hampshire. In 1656 he supported the proposition to offer the crown to Cromwell, by whom he was appointed a member of the newly constituted House of Lords. At the Restoration he was excepted from the Act of Indemnity and escaped with his father-in-law, General Whalley, to America, settling first at Cambridge, and thence removing to New Haven in 1661 to escape arrest. He remained in hiding in and about New Haven and Guilford until 1664, when he fled for safer refuge to the house of the Rev. John Russel in Hadley, Mass. There is a tradition that he appeared on the occasion of an Indian attack upon Hadley on Sept. 1, 1675, rallied the frightened townsmen, and drove off the raiders. But there is no other record of even an attack on the town at that time. However, the incident has been used by Scott in his *Peveril of the Peak* and by Cooper in his *Wept of Wish-ton-Wish, or The Borderers* and forms the subject of "The Gray Champion" in Hawthorne's *Twice-Told Tales.* There is an affidavit alleging that Goffe was in Hartford in 1680, but there is no other trace of him subsequent to 1679. Consult Stiles, *History of Three of the Judges of King Charles I* (Hartford, 1794), and a close study by Sheldon in the introduction to the new edition of Judd's *History of Hadley* (Springfield, 1905).

GOFFSTOWN. A town in Hillsborough Co., N. H., 8 miles northwest of Manchester, on the Boston and Maine Railroad, and on the Piscataquog River (Map: New Hampshire, G 7). It contains the St. Anselms College and a public library. Goffstown is a summer resort and has manufactories of sashes and blinds. The town was first settled in 1748 and incorporated in 1761. Pop., 1900, 2528; 1910, 2579.

GOG AND MA'GOG. In Ezek. xxxviii. 1–xxxix. 20, an oracle is directed against Gog, Prince of Rosh, Meshech, and Tubal, announcing that he will be led to invade Palestine, accompanied by Paras, Cush, Put, Gomer, Togarmah, and people from "the sides of the north," only to meet with a crushing defeat on the mountains of Israel and to be buried with all his host in "the Valley of the Travelers to the Sea." "To the land of Magog" has the appearance of being an interpolation in xxxviii. 2, and the Greek translator seems to have read "Gog" and not "Magog" in xxxix. 6; the glossator evidently regarded Magog as a term covering the realm over which Gog ruled. Gog also occurs in the Greek version of Num. xxiv. 7 and Amos vii. 1; but the original reading in the first passage is doubtful, and the second is probably a late interpolation. Magog appears as one of the sons of Japhet in Gen. x. 2. As all the other sons represent well-known peoples—the Cimmerians, Medes, Greeks, Moschi, Tibarenes, and Tyrrhenians—Magog, no doubt, also stands for a definite people. If the name has been correctly transmitted, it may yet come to light in ancient inscriptions. It may be an expansion of Gog, which occurs in the form of Ga-ga in a letter of Amenhotep III (1411–1375 B.C.) to Kadashmanharbe (*Amarna Tablets*, i, 38) as the name of a people, and seems to have survived to the time of Strabo in Gogarene, north of Sacasene, near the Cyrus River (xi, 14). Josephus (*Ant.*, i, 123) and Jerome (*Com. in Ezech.*) understood Magog as referring to the Scythians. In Gen. x. 3 Ashkenaz (Ass. Ashkuza), son of Gomer (q.v.), appears to represent the Scythians. But just as the terms "Scythian" and "Sakae" were used by Greeks and Persians of many ethnic elements, so Gog, or Magog, may have come to include in later times both the Scythians proper and many other nations, like the Sarmatians, the Roxalani, the Bastarnians, and the Massagetæ.

Some modern interpreters, among them Wellhausen and Smend, regard Gog as a fictitious personage representing the reflection of the Scythian invasion in 625 B.C. expected by Ezekiel to recur again. Others, like Bousset and Gressmann, who regard the two chapters as later than Ezekiel's time, consider Gog as a mythical figure and look to Babylonian lore for an elucidation of the oracle. Others have felt that a distinct historic personage is in the author's mind. Grotius was led by a suggestion already thrown out by Polychronius, the brother of Theodore of Mopsuestia, to the idea that Ezekiel used the name of the Lydian King Gyges in prophesying the career of Antiochus III. Seinecke thought of Antiochus IV Epiphanes. Winckler assumed that the writer was a contemporary of Alexander the Great and referred to his invasion of Syria. But neither Antiochus III nor Antiochus IV nor Alexander could well be designated as "prince of Rosh, Meshech, and

Tubal.” Schmidt suggested that “prince of Meshech and Tubal” would be a most appropriate title of Mithridates VI of Pontus, a native and ruler of the territory associated with these names. If “Rosh” is the name of a people and refers to the Roxalani, the Ros of Georgius, Simon Logotheta, Zonaras, and Tzetzes (Gesenius, *Thesaurus,* s. v.), the appropriateness, after the victory over this people by Mithridates, is even more striking. Among his forces were Persian auxiliaries, Egyptian ships, Cappadocian troops, Armenian contingents, and Scythian, Sarmatian, and Bastarnian soldiers. His terrible massacre of 80,000 Italians in Asia Minor, and his robbery of 800 talents from the Jews on Cos, then in league with Rome, would naturally have aroused hatred and excited the fear that he would invade Syria, as his ally Tigranes afterward did, and also the hope that he would be defeated on the old battlefields in the valley of Esdraelon, and that the ruler of Scythia would be buried in the city of Scythopolis (Beth Shean). If this identification is correct, the name “Gog” would be natural, and the position of the oracle in the Book of Ezekiel would be due to a reader or copyist familiar with his style. In Rev. xx. 8 Gog and Magog are nations gathered from the four corners of the earth by Satan to the last war after the millennium. It was probably through Christians that Mohammed became familiar with them. He alludes to Yagug and Magug as nations against whom Dhu’l Karnain (Alexander) built a marvelous wall (Koran, xviii, 93–97), and also as peoples that were to appear in the distant future (ib., xxi, 95 f.). A poem by a Christian of Edessa published by Knös (*Chrestomathia Syriaca,* Göttingen, 1807) also refers to Alexander and the wall of brass. Rumors of the Chinese Wall, built by Shi Hwang Ti, are probably at the basis of the legend. Mohammed’s references to the wall naturally awakened curiosity; and al Wathik is said to have sent an expedition from Samarra in 842 A.D. to seek for it, which reported to have found it 27 days’ journeys beyond Derbent on the Caspian Sea. They could not have reached the Chinese Wall in that time; and if they had, they would have known that it was not of brass. Arabic geographers relate that Yagug and Magug are of small stature and live chiefly on fish. The description applies well to the Massagetæ, a Scythian people in the wider sense of the term, whose name seems to mean “fish eaters.” In Arabic as well as later Hebrew eschatology Gog and Magog are to come to the last war across Lake Tiberias to the plain of Esdraelon. Consult: the commentaries on Ezekiel by Jerome, Polychronius, in Migne, *Patrologia Græca,* Grotius, vol. clxii (Paris, 1854–66), Rosenmüller, Hitzig, Smend, Knabenbauer, Bertholet, Krätzschmar, Skinner, Toy, Lofthouse; also Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914); Seinecke, *Geschichte des Volkes Israel,* vol. ii (Göttingen, 1884); Winckler, *Altorientalische Forschungen,* vol. ii (Leipzig, 1898); Schmidt, art. “Scythians,” *Encyclopædia Biblica* (New York, 1903); Bousset, *Die Religion des Judentums* (Berlin, 1903); Gressmann, *Der Ursprung der israelitisch-jüdischen Eschatologie* (Göttingen, 1905); Weber, *Judische Theologie* (Leipzig, 1897); Herrmann, *Ezechielstudien* (Leipzig, 1908); Herbelot, *Bibliothèque Orientale,* art. “Iagiouge et Magiouge” (2d ed., Paris, 1783); Michaelis, *Supplementa* (Göttingen, 1784–92); Gesenius, *Thesaurus* (Leipzig, 1835–53, “Rosh” by Roediger); Montgomery, “Gog and Magog,” *The Jewish Encyclopædia,* vol. vi (New York, 1904).

Gog and Magog are names popularly given to the two wooden statues of giants preserved in the Guildhall at London. According to the story, the living prototypes of the two figures were the survivors of a race of giants found in Britain by Brute, son of Antenor of Troy, and by him subdued. They were brought prisoners to London, where they were chained to the gates of a palace on the site of the Guildhall and kept as porters. When they died, their effigies were set up in their place. This is Caxton’s account; but there is another, which represents one of the giants as Gogmagog and the other as a British giant who killed him, named Corineus. The two giants have been the pride of London from time immemorial. On London Bridge they welcomed Henry V in 1415; in 1558 they stood by Temple Bar when Elizabeth passed through the city gate. The old giants were burned in the great fire, and the new ones were constructed in 1708. They are 14 feet high and occupy suitable pedestals in the Guildhall. The ancient effigies, which were made of wickerwork and pasteboard, were carried through the streets in the Lord Mayor’s shows, and copies of the present giants were in the show of 1837.

GOGARI. See Gogra.

GOGERLY, gō′jẽr-lĭ, Daniel John (1792–1862). An English missionary and scholar, the founder of Pali scholarship. Born in London, of German descent, he left England in 1818 to take charge of the Wesleyan Methodist printing office in Colombo, entered the ministry in 1822, and labored as a Methodist missionary in Ceylon. He developed remarkable linguistic talent, could preach in Singhalese and Indo-Portuguese, and was the first European to master the ancient sacred Buddhist language of Pali, the native language of Magadha, the country of the Buddha. He not only compiled a *Dictionary* of 15,000 words, but had the Buddhist priests write out the whole of their Pali books with their authorized glossaries or comments, a collection he bequeathed to the mission. In 1838 he became superintendent of the mission. He translated the *Játaka-pata* (the Book of 550 births of Buddha), and by his translations and discussions was the first to introduce to European scholars a scientific knowledge of the Pali in original Buddhism. He also published in 1862 the first able defense of Christianity in Singhalese, a book which led by reaction to the awakening of the Buddhist consciousness in Ceylon. He died at Colpetty, Ceylon.

GOG′GLE-EYE′ (so called from its protruding eyes). The rock bass (*Ambloplites rupestris*), locally so called. See Rock Bass; Warmouth.

GOG′GLE-NOSE′ (so called from the round, black spots on its nose, which resemble goggles). A local name among American gunners for the surf scoter (duck). See Scoter.

GOGH, gôg, Vincent van (1853–90). A Dutch figure, still-life, and landscape painter, one of the leaders of post-Impressionism (q.v.). He was born at Groot-Zundert, a village of North Brabant (Holland), the son of a Protestant clergyman. Destined for an art dealer, he was until his twenty-third year in the employ of the firm of Goupil and Company, at The Hague, London, and Paris. He was a schoolmaster in England, studied theology in Amsterdam, and then became an evangelist among the gold miners of Belgium. Although he had always designed and modeled, he did not begin the study of painting until 1882, at The Hague. In 1884 he studied a short time at the Academy in Antwerp, whence he removed to Paris, joining his younger brother, Theodore, an art dealer of Modernist predilections, who brought him in touch with the Impressionists. He afterward removed to southern France, painting at Arles and Saint-Remy. At this time he was much in the company of Gauguin (q.v.), who greatly influenced his work. Always in delicate health, he spent his last days in a hospital for nervous diseases at Auvers-sur-Oise, and there he committed suicide.

His work naturally falls into two periods, separated by the year 1885—a Dutch period of preparation and the French period of his mature art. His earliest works were powerful peasant pictures, such as "Winter" and "The Shepherds" (both in the Peletier collection, Utrecht) and the remarkable "Potato Eaters." His landscapes of the country about Arles and elsewhere in southern France are characterized by broad surfaces of color, skillful treatment of light, and linear rhythm. A fine "Autumn Landscape" is in the Museum of Meudon. He also painted characteristic figure pieces, such as several peasant women of Arles, Dr. Gachet, and his own portrait in several versions, and the powerful and gloomy "Prison Court." He was, above all, a colorist, who worked in broad surfaces of pure color rather than in values. His letters to his brother Theodore, who supported him throughout his artistic career and died of grief as a result of his death, and to his friend Emil Bernard, were published by the latter in 1911. They contain strikingly original views on art, expressed with force and lucidity. An English version of his letters was published under the title *Letters of a Post-Impressionist* (Boston, 1913). Consult the monographs by Meyer-Graefe (Munich, 1910) and Bremer (Amsterdam, 1911).

GOGOL, gō′gŏl, Nikolai Vasilievitch (1809–52). One of the greatest of Russian writers, born in the Province of Poltava (Little Russia), of a family of Cossack origin. On graduating at the Nyezhin Lyceum he went to St. Petersburg (1828) and was a clerk in the Department of Appanages in 1830–32. During these years he published a series of sketches, *Evenings at a Farmhouse near Dikanka.* In these he exploited his personal knowledge and his grandfather's stories of Cossack everyday life. These sketches attracted immediate attention and introduced their author into the select circle of Pushkin and Zhukovsky (qq.v.), who obtained for Gogol an instructorship in literature and in 1834 an adjunct professorship in history. This latter position he soon resigned for purely literary work. During 1832–34 appeared a second series of Ukrainian sketches, *Mirgorod* (collected in 1835), containing among others, *Taras Bulba, Old World Proprietors,* and *How the Two Ivans Quarreled. Taras Bulba,* rewritten and enlarged in 1842, is a glowing picture of the Cossack struggles with the Catholic Poles and Mohammedan Tatars in the sixteenth century. It is an epic in poetic prose and the best historical novel of the time. The two other sketches are minute studies of the picturesque life of Little Russian (Ukrainian) villages. After these inimitable bits of realism Gogol wrote two series of sketches in a more romantic vein—*Arabesques* (1834) and *Tales* (1836), dealing with Great Russian life, chiefly of St. Petersburg. In 1836 appeared the comedy *Revizor* (Inspector General), which held up to ridicule the ignorance, corruption, trickery, and arbitrariness of provincial officialdom. A distressed cry of treason went up from all who were supported by state money, and but for the will of Nicholas I, who heartily enjoyed the bold comedy, it would have been immediately withdrawn from the stage. The intense mortification at the general protest his play aroused undermined Gogol's constitution, and for 12 years thereafter he lived mostly abroad, searching in vain for health. In 1842 he published the first volume of *Dead Souls,* describing the adventures of one Chichikov, who travels all over Russia in pursuance of a scheme to become an estate holder by purchasing the dead serfs (souls of the dead), who are officially counted as living until the next census is taken. This almost plotless novel presents types of all walks of Russian life, drawn with all of Gogol's former art and with a mastery still more marked. The second volume was almost ready in 1845; but the author, in a fit of hypochondria, of which he had become a victim and which made him a religious mystic and champion of autocracy, consigned the precious manuscript to the flames. A rough draft and detached scraps of it found after his death were pieced together and published by his friends. It clearly reflects his dwindling intellectual powers; the personages are mostly figures of the "respectable" type, drawn not from actual life, but simply as a foil to the characters in the first volume. The *Excerpts from the Correspondence with my Friends* (1847) presented the painful spectacle of recantation and negation of his artistic work, in a manner anticipating Tolstoy's similar utterances. Gogol died in Russia, after a pilgrimage to Jerusalem in 1848. He is generally considered the founder of the Natural school, and the father of realism and the modern period of Russian literature. The latest complete edition of his works in Russian is that of Bykov (Moscow and St. Petersburg, 1911), containing a good biographical sketch by Dmitry Merezhkovsky. Almost all his works are available in both French and German. The English translations are: Hapgood, *St. John's Eve and Other Stories; Taras-Bulba; Tchitchikoff's Journeys, or Dead Souls* (New York, 1886); Mandell, *The Revizor* (New Haven, 1910).

GOG′RA, or **GOG′ARI**. One of the largest affluents of the Ganges (q.v.), British India, joining that river from the left near Dinapur after a generally southeast course of 600 miles. It rises in lat. 30° 28′ N. and long. 58° 40′ E., on the southern declivity of a Himalayan range near the border line of Nepal and Tibet. After receiving many tributaries on both sides, it enters the great plain of Hindustan, 148 miles from its source, and 70 miles lower down becomes navigable for craft of considerable burden. Farther down it is navigable for boats of all sizes at all seasons and is one of the most important waterways of India. The principal affluents are the Sarju (a name sometimes applied to reaches of the Gogra) and the Rapti.

GOHIER, gō′yā′, Louis Jerôme (1746–1830). A French politician, born at Semblançay (Indre-et-Loire). A distinguished advocate, he was deputy from Ille-et-Vilaine to the Legislative Assembly of 1791, where he strongly opposed the civil constitution for the clergy. The following year he became Secretary of the Department of Justice and then Minister of Justice (1793), succeeding Garat. He was president of the criminal court, judge of the Court of Cassation, and last President of the Directory (1799). He refused to participate in Napoleon's coup d'état. In 1802 Napoléon made him Consul General to Holland and wished to send him in the same capacity to the United States (1810), when Gohier retired from public life. His *Mémoires* were published in 1824.

GOIL, goil, Loch. A small sea loch in Argyllshire, Scotland, a branch of Loch Long, 6 miles in length and less than 1 mile in breadth. Its shores are very steep, wild, and rugged, but diversified by extensive woods of hazel. Lochgoilhead is a favorite summer watering place.

GO'ING, Charles Buxton (1863–). An American engineer, author, and editor, born at Westchester, N. Y. Graduating from Columbia College School of Mines in 1882, he at once took up, in the Middle West, active work in industrial chemistry and corporation management. He joined the staff of the *Engineering Magazine* in 1896, becoming managing editor in 1898 and editor in 1912. In this connection he did much to discern, define, and establish the now fully recognized profession of "industrial engineering." He became special lecturer on this subject at Columbia, Harvard, New York University, and the University of Chicago, and much of the best literature on this subject appeared under his editorial encouragement. He received the degree of M.Sc. (hon.) from Columbia in 1910. His writings include *Methods of the Santa Fé* (1909) and *Principles of Industrial Engineering* (1911), and, in lighter vein, *Summer-Fallow* (1892) and *Star-Glow and Song* (1909); also, in collaboration with Marie Overton Corbin (later Mrs. Going), *Urchins of the Sea* (1900) and *Urchins at the Pole* (1901). He was a contributor to the second edition of the New International Encyclopædia.

GOITO, gō'ē-tō. A town in the Province of Mantua, Italy, on the right bank of the Mincio, 11 miles northwest of the city of Mantua (Map: Italy, C 2). Its vicinity to Mantua has made it the scene of numerous battles, notably that between the Piedmontese and the Austrians in April and May, 1848, when the former were victorious. Pop. (commune), 1901, 5694; 1911, 6702.

GOI'TRE (Fr., from Lat. *gutter*, throat). An enlargement of the thyroid gland (q.v.) occupying the front of the neck, and sometimes of such a size as to project downward over the breast and even admit of being thrown over the shoulder. Goitre is, for the most part, an endemic or local disease, being found in the mountainous regions of the Alps, Andes, and Himalayas, in the Pennine Range, and in Derbyshire, England (whence Derbyshire neck), in the Rhone valley, in the Indian Punjab, and in north Italy, especially, it is said, where lime prevails largely as a geological formation. The connection of goitre with drinking water is a very ancient belief. Goitre wells are mentioned by Pliny and Vitruvius. Mungo Park is said to have found evidence of the belief in Africa, and Gage discovered a similar one in the West Indies in the seventeenth century. Men subject to military service drink the water of goitre wells in order to acquire the disease and thus escape conscription. On the other hand, families living in goitre districts have been known to escape the malady by drinking only rain water or wine. Again it has been noted that goitre streams or wells may change their character. Sometimes a well may acquire goitre-producing qualities. Some rivers produce goitre only at particular points in their course. In certain goitre districts in Italy and Switzerland the disease has been controlled by the introduction of water from a goitre-free region. Women are oftener affected with goitre than men. An explanation offered for this fact is to the effect that they drink more water than men. Répin, in 1908, found a high degree of radioactivity, due to radiothorium, in the waters of the Swiss Alps. Goitre is met with endemically to a slight extent in various parts of Scotland, but on a very small scale indeed as compared with Switzerland, in which it is a very important deformity, especially when connected with cretinism (q.v.). Sporadic goitre may occur in any country. The pathological changes which underlie the enlargement of the thyroid in goitre are not always the same in all cases. The enlargement of the gland may be due to a general hypertrophy of all the tissues, *simple goitre;* or depend on an overgrowth of the fibrous elements alone, *fibrous goitre;* or one or several of the normal alveolar spaces may become dilated, constituting *cystic goitre;* in other cases there is little new gland formation, the increase in size being due to dilatation of the blood vessels, which causes an expansile pulsation in the mass, *pulsating goitre;* later on, the gland may become indurated from the deposition of lime salts, forming the variety known as *calcified goitre.* The thyroid gland often becomes temporarily enlarged in women during the menstrual period or at puberty. In the form of goitre known as exophthalmic goitre (see Basedow's Disease), which is marked by protrusion of the eyes (*exophthalmos*) and functional disturbance of the heart action, there is increase in the size of the thyroid, which is in most cases a condition of active glandular proliferation. From the symptoms of this disease taken in connection with the known effect of thyroid extract upon the system, there is little doubt that the change in the gland is the pathological basis of the disease. The treatment of goitre, not of the exophthalmic variety, consists in the administration of very minute doses of iodine for a long time internally, locally by inunction, or locally by cataphoresis. The X-ray alleviates or cures in a large percentage of cases. (See Electricity, Medical Uses of.) In a few rare cases the administration of thyroid gland has cured. In others the administration of thymus gland has cured. In India, especially, applications of the biniodide of mercury to the tumor, followed by exposure to the sunlight, has proven a successful method of treatment. Consult article on "Goitre" by Dock, in Osler's *Modern Medicine* (2d ed., Philadelphia, 1914), and McCarrison, *Etiology of Endemic Goitre* (London, 1913).

GOKHALE, gō'kăl-ā', Gopal Krishna (1866–1915). An East Indian educator and political leader. He was born in Bombay and, after receiving an excellent education in native and English colleges, became a professor in Ferguson College, Poona. There he remained for 20 years, during which he devoted himself to promoting education among his Mahratta fellow countrymen. He became actively identified with the National Indian Congress movement, and by his moderation and enlightened views came to be accepted as a safe leader of the Indian Progressives. In 1905 he was elected President of the Indian Congress. He gave evidence before the Indian Expenditure Commission in London. In 1905 he founded the Servants of India Society and in 1912 was appointed a member of the Royal Commission on Public Services in India. He was elected a fellow of Bombay University. As a writer and speaker also, he became well known.

GÖKINGK, gẽ′kĭṉk, Leopold Friedrich Günther von. See Göckingk.

GOKTCHA, gŏ̂k′chä, or **SEVANGA** (syĕ-vän′gȧ) **LAKE.** A lake in the Transcaucasian Government of Erivan, situated at an altitude of about 6300 feet and surrounded by high barren mountains of volcanic origin (Map: Russia, G 6). It is about 45 miles long, 23 miles wide, 67 fathoms deep, and has an estimated area of 540 square miles. It receives a large number of mountain streams. The outlet is through the Sanga, a tributary of the Aras. In the northwestern part of the lake is the lava-formed island of Sevang, with an old Armenian monastery.

GOLAW, gō′läv, Salomon von. The pseudonym of the German epigrammatist Friedrich Logau (q.v.).

GOLCON′DA. A ruined city and fortress in the Nizam's dominions, India, 5 miles west-northwest of the capital, Hyderabad, in lat. 17° 22′ N. and in long. 78° 25′ E. The ruins of the ancient city, once the metropolis of the Kingdom of Golconda, the solid mausolea of its former sovereigns, which form a vast group at a distance of 600 yards from and overlooking the fortress, and the fortress itself, are all of great archæological importance and interest. The fort is now used as a state prison and as the Nizam's treasury. Golconda is proverbially famous for its diamonds, which, however, were merely cut and polished here, being generally found at Purtial, near the southern frontier of the Nizam's dominions.

GOLD (AS., OHG. *gold*, Ger. *Gold*, Goth. *gulþ;* connected with AS. *geolu*, Eng. *yellow*, Lat. *helvus*, grayish yellow, Gk. χλωρός, *chlōros*, yellowish green, Skt. *hari*, yellow). A metallic chemical element, probably the first metal known to man. The alchemists regarded gold as the most perfect metal, compared it to the sun, and designated it by the same symbol by which they represented that orb; their efforts were constantly directed towards the transmutation of baser metals into pure gold. Gold is widely distributed in nature and is frequently found native, though usually alloyed with silver and containing small quantities of copper or iron; it is also associated with palladium, rhodium, and bismuth. It is sometimes found crystallized, usually as octahedra or tetrahedra, but more commonly in thin laminæ or grains in sand or gravel. Its presence in this condition is believed to have been caused by the disintegration of gold-bearing rocks, and it is readily collected from such alluvial sources by washing the auriferous soil. The purest specimens of native gold have yielded from 99.7 to 99.8 per cent of the pure metal, the average California gold containing 88 per cent, while Australian gold sometimes runs as high as 96 per cent pure metal. Gold also occurs in combination with mercury as electrum, with silver and tellurium as sylvanite, and with tellurium and lead as nagyagite. It is further found in various sulphides, as those of copper, lead, iron, and zinc; also in other ores, and in very small quantities in sea water.

Gold (symbol, Au; atomic weight, 197.2) is of a bright yellow color when pure and has a high metallic lustre. It is the most malleable of all metals and has been hammered into a leaf 0.00009 millimeter in thickness. In this condition it appears green by transmitted light. Gold is very ductile and can be drawn into wire so fine that 166 meters weigh but a single gram. Its specific gravity is 19.31, and it melts at about 1075° C. It is a good conductor of both heat and electricity. Whatever the temperature, neither water nor oxygen is capable of attacking it; and it is not affected by fusion with potassium chlorate. It yields, however, to alkalies and nitrates and especially to sodium or potassium cyanide. It is not dissolved by any single acid, except selenic, but readily passes into solution when treated with aqua regia (a mixture of nitric and hydrochloric acids) or with other acid liquids in which chlorine or bromine is evolved. Pure gold, being too soft for all ordinary purposes, is generally alloyed with other metals. With copper it yields a reddish alloy, which is quite hard; the standard metal used for coinage is made up of 900 parts of gold and 100 of copper. With silver it yields so-called "white alloys," which are used for jewelry. It amalgamates readily with mercury, forming a white amalgam of a pasty consistency. The most extensive uses of gold are for coinage, jewelry, gilding purposes, electroplating, and in dentistry.

Compounds. With oxygen gold forms a monoxide, or *aurous* oxide, and a trioxide, or *auric* oxide. The former is obtained by decomposing aurous chloride with cold dilute potassium hydroxide; the latter by heating a solution of gold trichloride with an excess of magnesia and well washing the precipitate with nitric acid. Auric oxide, which is the more common of the two, combines with bases, forming salts called *aurates.* Perhaps the most important of the compounds of gold with acids is auric chloride, which is readily obtained by dissolving metallic gold in aqua regia and evaporating the solution to crystallization. The resulting orange-red crystals may be further purified by recrystallization. It is a very deliquescent salt and is chiefly employed for toning silver prints in photography.

Fulminating Gold, which was originally described in a work published under the name of Basil Valentine, is a green or brown powder that readily explodes when dry; it may be obtained by the action of ammonia on gold hydroxide, or by precipitating gold chloride with ammonia or its carbonate.

Gold Purple, or *Purple of Cassius,* which was originally prepared by Andreas Cassius, and described in 1685, is a flocculent purple precipitate obtained by treating a solution of stannous and stannic chlorides with gold chloride. The resulting product is believed to be a mixture of tin oxide and finely divided gold. The color of ruby glass is due to small proportions of this pigment.

Mosaic Gold is a fine flaky yellow variety of tin bisulphide; it is prepared by heating a mixture of seven parts of sulphur, six parts of ammonium chloride, and 18 parts of a powdered amalgam consisting of two parts of tin to one of mercury. When the odor of hydrogen sulphide is no longer perceptible, the heat is raised to low redness, and the mercurous chloride, ammonium chloride, and mercuric sulphide are volatilized. The mosaic gold thus obtained is used as an imitation bronze in the arts.

Production of Gold. The supply of gold in ancient times was derived mostly from surface deposits of sands and gravels which yielded their values by simple processes of washing. Gold was thus mined at a very early period in India, Central Asia, the southern Urals, and in the region bordering the eastern Mediterranean. With the progress in metallurgical knowledge attention was directed to the exploitation of auriferous veins, a branch of the industry which seems to have attained to some importance before the opening of the Christian era. Ancient workings of this character, ascribed to the Egyptians, have been found in the mountains of Nubia; and Dr. Karl Peters has described extensive mines in the interior of South Africa, not far from the gold fields of Rhodesia—a locality believed by Dr. Peters to be the Ophir of the Israelites. The Romans operated mines in Hungary, Spain, and Great Britain at various periods. During the Middle Ages the mining industry seems to have made little progress. It is estimated that the total stock of gold in Europe when America was discovered did not exceed $225,000,000.

The first gold mined in the United States came from the Appalachians. As civilization advanced west the production increased. With the discovery of new districts, such as California, South Africa, Australia, and Alaska, the increase in production was very marked. With improvements in the metallurgical extraction, low-grade deposits have become workable which only a few years ago were considered of no value; this has resulted in a gradual increase, not so marked as the discovery of new districts.

WORLD'S PRODUCTION 1493–1912 *

PERIOD	Years	Annual average production
1493 to 1600	107	$4,687,000
1601 " 1700	100	6,064,000
1701 " 1800	100	12,628,000
1801 " 1850	50	15,750,000
1851 " 1875	25	126,960,000
1876 " 1880	5	114,586,000
1881 " 1885	5	99,116,000
1886 " 1890	5	112,895,000
1891 " 1895	5	162,947,000
1896 " 1900	5	257,301,000
1901 " 1905	5	328,619,000
1906 " 1910	5	483,453,000
1911	1	461,542,000
1912	1	466,136,000
1913 †	2	455,534,000

* Annual Report, 1912, Director of the Mint.
† Estimate by Director of Mint.

The accompanying statistics of world production were compiled by the late Adolf Soetbeer and by the United States Mint from the most authoritative sources. It is interesting to note that the production for the 26 years from 1886 to 1912 has exceeded that of the previous 394 years.

The gold-producing countries mentioned in order of their importance, and the percentage of their output in 1911 as compared with the total output, were: Africa, 41.5 per cent; United States, 21 per cent; Australia, 13 per cent; Russia, 7 per cent; and Mexico, 5.3 per cent, leaving a balance of 12.2 per cent for the remaining countries of the world. Brazil, which has been only slightly explored, showed a large percentage of increase in 1911 over that of 1910, and very extensive mining developments which were in progress in Chile in 1914 it was thought would probably result in considerable increase in the production from these countries in the near future. The table on page 97, giving the gold output from the various countries of the world, is taken from the Report of the United States Mint for 1912.

United States. In the United States, as elsewhere, the occurrence of gold is limited to areas of crustal and volcanic disturbances, these apparently being the prime factors that govern the formation of ore bodies the world over. There are, thus, two distinct regions in which gold is produced—the eastern region along the Appalachian Mountains, and the western, or Cordilleran, region. Gold has been found at numerous localities on the eastern slope of the Appalachians, and the mountain system might be said to be gold-bearing throughout its extent from Newfoundland to Alabama, although workable deposits occur only in Nova Scotia, Canada, and the Southern States. In the United States the auriferous belt, varying from a few miles to 75 miles in width, extends from Virginia through North Carolina, South Carolina, and Georgia, into Alabama. Both veins and surface deposits are worked. The veins of auriferous quartz cut through the slates and schists, generally forming only small pockets of ore. Associated with the gold is usually a small percentage of the sulphides of copper and iron. Some pockets of ore are exceptionally rich, and specimens of quartz literally covered with gold are to be found. The Haile gold mine in South Carolina, no longer worked, was a large low-grade body of auriferous schist; this mine was operated for a number of years and attracted considerable attention. It was at this property that the Keith lead-lined chlorination barrel for the extraction of gold was developed. The Dahlonega district in Georgia has also attracted considerable attention, and placer or surface mines have been worked in this district. In North Carolina the tendency is for the gold to occur in quartz veins. The first gold shipped to the mint for coinage from the Southern States was from North Carolina in 1804. For 20 years following, the annual output from North Carolina did not exceed $2500. In 1829 Virginia and South Carolina, in 1830 Georgia, in 1831 Alabama and Tennessee, and in 1868 Maryland, shipped gold to the mint for coinage. Since then the production, although small, has been fairly constant.

The Western gold fields are scattered over the whole region between the eastern foothills of the Rocky Mountains and the western slopes of the Sierra Nevada and Cascade ranges and extend from Alaska into Mexico. In 1848 gold was first discovered in California in an excavation made for the tailrace to a water-power mill. This discovery caused the gold-rush excitement of '49, when men from all parts of the world rushed by boats and by wagons across the prairies to the new gold district. The wonderful richness of this new discovery furnished the in-

GOLD PRODUCTION OF THE WORLD

Countries	Troy ounces 1909	Troy ounces 1910	Troy ounces 1911	Value 1911	Value 1912	Value 1913
North America						
United States	4,821,701	4,657,017	4,687,053	$96,890,000	$93,451,500	$88,301,000
Canada	453,865	493,707	472,241	9,762,100	12,649,000	15,250,000
Mexico	1,153,400	1,205,051	1,203,573	24,880,100	24,500,000	20,500,000
Cuba	....	....	967	20,000		
Africa	8,271,575	8,474,809	9,265,672	191,538,400	213,800,000	207,700,000
Australia	3,435,007	3,167,140	2,911,410	60,184,200	54,509,400	55,474,500
Europe						
Russia	1,566,443	1,721,163	1,555,333	32,151,600	22,199,000	22,199,000
Austria-Hungary	93,446	105,101	105,705	2,185,100	2,043,000	2,043,000
Germany	3,348	3,042	3,042	62,900	78,100	78,000
Sweden	491	95	95	2,000	20,300	20,000
Italy	1,168	1,430	2,165	44,800	11,000	11,000
France	67,754	82,580	82,580	1,707,100	1,812,000	1,812,000
Servia	7,273	....	12,833	265,300	251,000	250,000
South America						
Argentina	9,186	8,372	13,979	289,000	107,300	107,800
Bolivia Chile	23,819	22,429	11,517	238,100	175,000	175,000
Colombia	153,826	163,022	153,941	3,167,800	2,971,700	2,971,700
Ecuador	13,273	12,054	13,389	276,800	406,500	406,000
Brazil	108,983	94,557	185,496	3,834,500	3,570,000	3,570,000
Venezuela	13,576	16,472	17,648	364,800	623,500	623,500
Guiana						
British	57,697	57,697	43,149	892,000	879,000	879,000
Dutch	30,041	38,344	25,320	523,400	407,000	407,000
French	103,708	107,835	107,835	2,229,100	3,050,000	3,050,000
Peru	24,890	22,055	22,655	455,900	492,200	492,000
Uruguay	4,433	4,433	3,422	70,600	111,000	111,000
Central America	127,229	225,302	162,588	3,360,400	3,030,500	3,030,000
Asia						
Japan	174,966	189,837	193,865	4,007,500	4,467,000	4,467,000
China	452,406	176,960	160,344	3,314,600	3,658,000	3,658,000
Indo-China	3,174	2,655	2,655	55,000	74,700	74,000
Chosen (Korea)	96,440	212,808	139,774	2,889,400	2,852,000	2,852,000
Siam	15,850	2,733	2,733	56,500	56,000	56,000
British India	501,097	518,502	534,744	11,054,100	11,055,700	12,144,200
East Indies						
British	69,510	69,988	64,791	1,339,400	1,352,000	1,352,000
Dutch	103,832	163,852	163,852	3,387,100	3,387,000	3,387,000
Total	21,965,111	22,023,178	22,327,088	$461,542,100	$466,136,000	$455,533,000

centive for the exploration and development of the whole Far West.

The accompanying statistics for the Appalachian States are taken from the Annual Report of the Director of the Mint for 1912:

GOLD PRODUCTION, APPALACHIAN STATES, 1799 TO 1912

States	Total production	Annual average, 1902–1911	Production, 1912
Alabama	$724,772	$25,120	$16,400
Georgia	17,671,915	60,912	10,900
Maryland	73,350	2,272	1,200
North Carolina	22,641,589	88,197	156,000
South Carolina	5,856,258	73,113	15,400
Tennessee	214,697	3,513	11,500
Virginia	3,288,997	4,721	300
Total	$50,277,881	$257,848	$211,700

The gold occurs in three types of deposits—river gravels, or placers, high gravels, and veins. The river gravels, found in the beds of the numerous streams that flow down the western slopes of the Sierras, have been derived from the higher levels, where the erosive processes have cut deeply into the auriferous rock formations. Most of the gold is generally found near bed rock, and it is necessary to remove a heavy overburden before the values can be obtained. The gold particles vary from minute pellets or dust to nuggets of considerable size. The high gravels represent the work of ancient rivers whose channels are more or less parallel to those of the present day, but have been filled in with detrital materials and frequently buried beneath lava flows. They lie along the higher slopes of the Sierras up to 5000 feet above sea level and sometimes attain a thickness of 500 feet. The veins, which have furnished the gold found in both the placers and high gravels, occupy fissures in slates, schists, and igneous rocks, and are of variable extent and richness. Quartz is generally the gangue material, while the gold occurs in a free state or combined with sulphides, most commonly pyrites. A great series of these veins, called the "mother lode," extends across Tuolumne, Calaveras, Amador, and El Dorado counties; for a number of years it has been the source of much of the gold mined in the State. The Comstock Lode (q.v.) is situated on an eastern spur of the Sierras, extending into Nevada. Placers and veins similar to those of the Sierras are found also in Oregon and Washington.

The Rocky Mountains and the outlying ranges, which were first prospected by Californian miners in the early sixties, include an immense area of gold-bearing territory. Rich gravels have been worked near Leadville, Fairplay, and in San Miguel Co., Colo.; near Helena and Butte, Mont.; along the Snake and Salmon rivers, Idaho; near Deadwood, S. Dak.; at Santa Fe, N. Mex.; and in Alaska. The output from the gravels, although large, amounted to only 24.22 per cent of the total output for 1911, as shown in the accompanying table:

PRODUCTION IN THE UNITED STATES IN 1912

States*	Troy ounces	Value
Alaska	831,981	$17,198,600
Arizona	183,117	3,785,400
California	967,887	20,608,000
Colorado	906,606	18,741,200
Montana	179,871	3,707,900
Nevada	656,772	13,575,700
South Dakota	378,476	7,823,700
Utah	208,693	4,312,600
14 other States	299,823	7,698,400
Total	4,520,719	$93,451,900
Source†	**Troy ounces**	**Value**
Deep mines	3,351,937	$72,321,000
Placers	570,865	21,160,000
Total	4,520,719	$93,481,500

* From Bureau of Mint Report, 1912.
† From United States Geological Survey.

The percentage of gold produced by the different States from deep mining requiring metallurgical treatment, and from residual deposits requiring only washing, is given in the accompanying table. In this table it will be noticed that Alaska produced 53.5 per cent, and California 38.3 per cent, of the total residual or placer gold produced in 1911.

PERCENTAGE OF PRODUCTION BASED ON SOURCE, 1911

States	Deep mining	Dredging placers	Other placers	Total placers
Alaska	5.9%	14.5%	84.3%	53.5%
California	14.0	74.4	10.0	38.3
Colorado	25.4	2.6	.4	...
Nevada	24.5	...	1.5	...
South Dakota	10.0	...	...	...
Utah	6.3	...	...	...
Other States	13.9	8.5	3.8	8.2
Total	100.0%	100.0%	100.0%	100.0%

The total output of the mines of the United States was in 1913 approximately $88,000,000.

California during 1911 produced 20.8 per cent of the total output of gold in the United States. Of this 54.5 per cent was recovered from deep mining and 45.5 per cent from placer. The output was derived from 1181 mines operating in 32 counties. The largest county production came from Yuba County, mainly from dredging operations. In deep mining the most productive in gold was Amador County.

Colorado during 1911 produced 19.7 per cent of the total output of gold from the United States. Cripple Creek, which has been one of the rich and large American producers, contributed 59 per cent of this production. This district became prominent in 1894, when the Independence mine was discovered. The ores were exceptionally high grade, the gold occurred in combination with tellurium, resembling silver, and the deposits were large. In 1905 approximately $18,000,000 in gold was produced. The district has been a heavy producer and is now treating successfully low-grade ores by concentration and cyaniding by a special process developed by Philip Argall, of Denver, for handling this particular ore. The San Juan district, in which the famous Camp Bird mine is located, in 1912 produced $4,119,191 as against $5,035,610 in 1911, $5,822,422 in 1910, and $6,170,201 in 1909; no new discoveries have been made in this district. The placer output amounts to only about 2 per cent of the total output of the State.

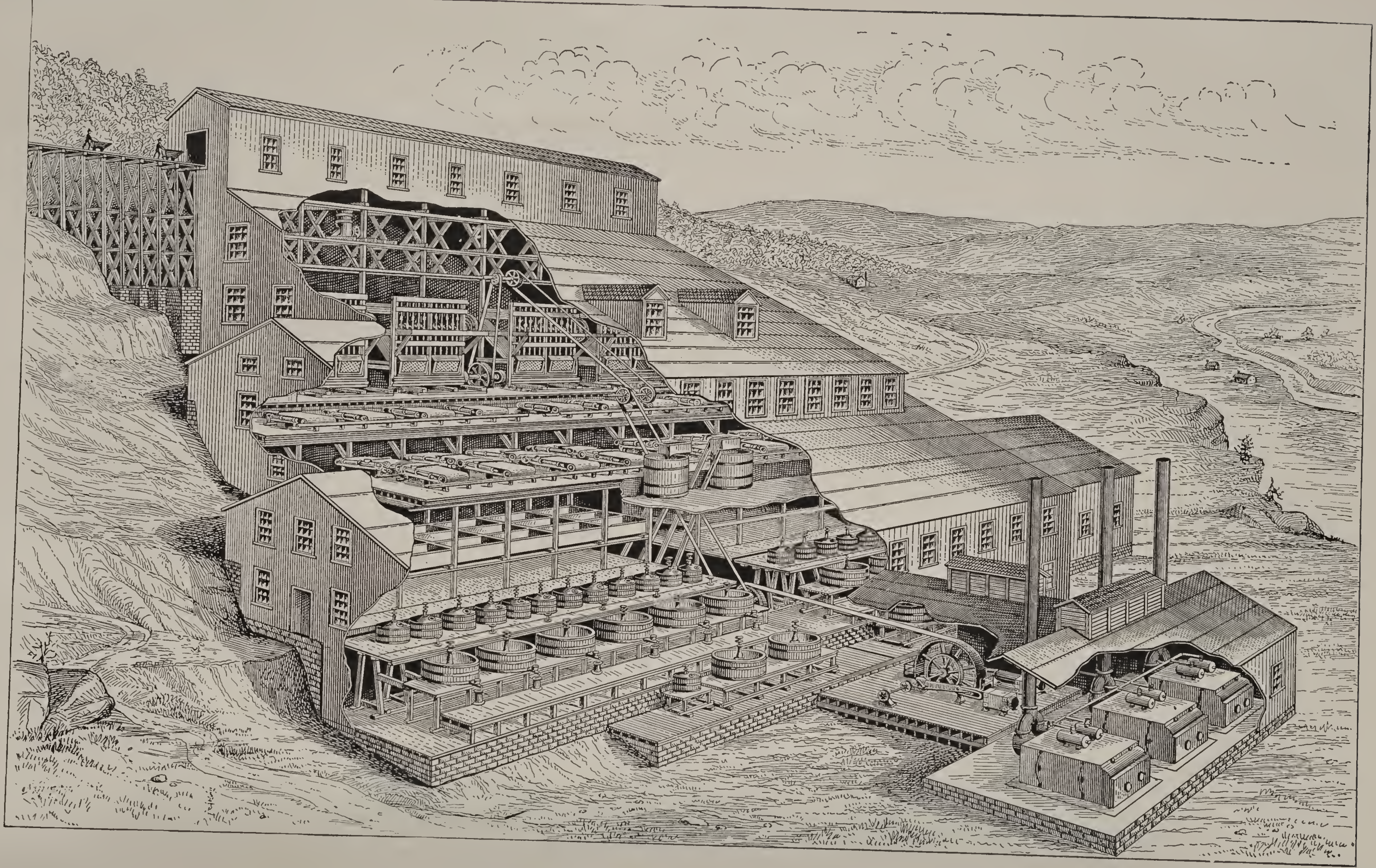
Nevada during 1911 produced 18.7 per cent of the total output of gold in the United States. About 50 per cent of the output was from Goldfields in Esmeralda County and 25 per cent from Tonopah in Nye County. Most of the ore is from deep mining, and the gold is recovered by amalgamation and cyaniding. The Tonopah mine, discovered about 1902, caused the rush to Nevada which resulted in the development of the Tonopah district and the discovery and development of the Goldfields district. Exceptionally high-grade ore was produced in the Goldfields district. The output from Nevada has been decreasing; the largest decrease was from the mines of the Goldfields district; in 1911 this decrease amounted to $850,000 and in 1912 to $4,047,000. The output from the State in 1912 was $13,456,000 as compared with $18,097,000 for 1911.

Alaska during 1911 produced 17.2 per cent of the total gold output of the United States, amounting to $16,665,200. In 1912 the production amounted to $17,145,951. About three-fifths of the output was from placers, but the ratio of output of placer gold to lode gold was decreasing as the richer gravels were being worked out and the deep or lode mines were being developed. During 1911 the recovery of placer gold per cubic yard amounted to $2.17, and during 1912 this recovery was reduced to $1.87. With the increased application of dredging the output of placer gold will probably be maintained for many years. The recovery per cubic yard from dredging during 1912 amounted to from 52 to 64 cents. The total output of placer gold during 1912 amounted to $11,990.000 as compared with $12,540,000 for 1911. The total output of gold from quartz mines in 1912 amounted to $5,002,000 as compared with $4,227,000 for 1911; of this output the low-grade mines of the Alaska-Treadwell Company, on Douglas Island, produced $4,418,000 in 1912 as compared with $3,904,000 for 1911. At Juneau, only a few miles east of the Alaska-Treadwell, on the mainland, very extensive developments were being completed in 1914 for the mining and milling of a large deposit of low-grade ore. This mill was to be in operation in 1915 and should affect considerably the output of gold from Alaska. Since 1882 and up to 1912 the lode or deep mines of Alaska have produced $57,811,000, and the placer mines, $157,800,000.

South Dakota was maintaining its output of gold from the low-grade ores of the Black Hills, with the indication that it probably would continue to do so for many years to come. The yield is wholly from siliceous ores. Mining and metallurgical practice of the highest grade have been characteristic of the successful operations, and particularly was this true of the Homestake mines, which have produced the bulk of the output. The milling practice consists of amalgamation followed by cyaniding. The total

GOLD MINING

GOLD MINING BY HYDRAULIC METHODS



A COMBINATION STAMP MILL AND EXTRACTION PLANT output of gold from South Dakota from 1875 to 1912 inclusive was $170,634,838, and the yield during 1912 amounted to $7,891,370, which was the largest ever recorded from the State.

The States above discussed produced about 84 per cent of the total output during 1911. There are numerous smaller fields located in Utah, Montana, Arizona, and elsewhere, which in the aggregate produce about 16 per cent of the output, of which a large percentage is recovered from the smelting of copper, lead, and zinc ores.

The total output of the mines of the United States in 1913 was approximately $88,000,000.

Africa. The gold production for 1911 amounted to $191,538,433. Of this amount the Transvaal produced $170,566,159; West Coast, $5,601,117; French Colonies, $1,865,349; and Rhodesia, $13,505,808. The production on the Transvaal was the largest in its history. It was reported that some of the shallow mines which are worked from the surface croppings would soon be worked out and that a few of the first deep mines have only a short life left. With the development of the "deep-deep" mines the cost of mining would increase, and this to some extent has been balanced by the reduction in total cost of operation by consolidating many properties and the building of large central mills for the recovery of the gold. The deposit consists of a conglomerate commonly called a "banket," varying from a few inches to several feet in thickness. It can be traced for several miles along the strike and for several thousand feet has retained its auriferous tenor in depth. From 1889 up to and including 1911 the Transvaal has produced over $1,582,000,000.

Australasia. The large output from alluvial deposits which first attracted the miner has largely been replaced by quartz mining due to exhaustion. The most productive states are Western Australia, with an output for 1911 of $28,337,994; Victoria, $10,418,471; New Zealand, $8,834,712; Queensland, $7,744,056; and New South Wales, $3,744,056. The average value of ore treated in Western Australia during 1911 was $10.009 as against $10.080 for 1910; in the East Coolgardie gold fields, from which comes over 50 per cent of the states' yield, the grade per ton has fallen from $9.798 to $9.268. The yield of gold obtained by dredging in New South Wales amounted to $99,245, showing a decrease from previous records.

Russia. Most of the gold produced by Russia has been obtained from placer workings on the eastern slope of the Ural Mountains. During 1911 mining was stimulated by the high price of platinum, and the year was one of general progress in precious-metal mining. In total gold production Russia and Siberia rank third, being surpassed by the United States and Australasia, but still remaining ahead of South Africa.

British North America. During 1911 British Columbia produced $4,930,150; of this the placer production amounted to only $468,000, and the balance was recovered from smelting of base-metal ores containing gold and also from milling quartz-gold ores. The Yukon district produced $4,930,150, of which $4,580,000 was recovered from placers. The production from Nova Scotia milling ores was estimated at $142,000. The gold veins of Nova Scotia are quite similar to those of the Southern States in the United States; no large ore bodies have been discovered. Quebec produces very little gold. It is interesting to note that the gold output of Ontario in 1911 was only $42,625 as compared with the large output of silver from the Cobalt district for the same year, amounting to $16,492,000. The Cobalt district was discovered by a blacksmith working on the building of the Temiskaming and Northern Ontario Railroad. This railroad was constructed to develop the lands in northern Ontario; its terminus was just north of Cobalt. A few years later the government started the extension of this line, and the prospectors preceded the construction. In 1909 the discovery of rich gold veins in Porcupine was reported, and long before the snow had gone in the spring of 1910 the district was filled with prospectors. During 1911 claims changed hands at high figures, with no other showing than the snow or possibly a "rock cropping." Mills were freighted in and boilers shipped by express to the end of the railroad so that they could be hauled over the snow and frozen lakes before the spring thaw and "break up." The summer of 1911 saw the entire district, mills and equipment, wiped out by a forest fire, with a heavy toll of life. In 1912 the two large mines, the Hollinger and the Dome, dropped their stamps for the first time and commenced the regular production of gold. The output from the Porcupine district was as follows: 1910, $35,539; 1911, $17,187; 1912, $1,731,000; and 1913, $4,285,000.

GOLD MINING

Gold-mining operations may be divided into two classes—placer mining, where the gold occurs in river beds or ancient river beds and in the native state scattered through sand and gravel; and vein or quartz mining, where the gold occurs native or associated with sulphides in a vein or ore body. Placer mining may again be subdivided into hydraulic mining and dredging, depending on the method used in excavating the gravel.

Hydraulic Placer Mining. This method of mining was first attempted in a crude way in 1852 in Placer Co., Cal., and was largely practiced until laws were passed practically prohibiting this method in the State. This method is now largely followed in Alaska, as the conditions leading to suppression in California did not exist in that territory. In 1912 California produced only 10 per cent of the total output of hydraulic placer gold, whereas Alaska produced 84.3 per cent. In California the hydraulic mining has largely been replaced by dredging. Briefly described, hydraulic mining consists of directing a powerful stream of water under a heavy head through a "giant" (nozzle) against the gold-bearing gravel bank, which breaks down the material and washes it away through specially constructed sluices, where the gold is saved. The sluices are large and built of heavy material to withstand the pounding of heavy bowlders washed through them. The first length of sluice terminates with a grizzly, or screen, consisting of parallel bars of iron; the large bowlders are removed at this point, and the smaller material carrying the gold passes through the grizzly into the second section of sluices. In this section are placed specially designed riffles to permit the coarser gold to settle from the gravel. At intervals the bottom of the sluice is replaced by a grating or grizzly to permit the finer material to go through and enter sluices which are built at right angles to the main sluice; in these cross sluices riffles are also placed to catch the gold. Mercury is added behind the riffles to amalgamate with the gold and prevent its washing away. When conditions are favorable *ground-sluicing* is sometimes resorted to. In this process a stream or portion of a stream is diverted and caused to flow steeply and rapidly across the placer bed, eroding and bearing away large quantities of gravel. In the pit where the speed of the current diminishes, one or more giants serve to sweep the gravel into the sluice boxes.

Dredging. On rivers, or where hydraulic mining is prohibited, dredges are used. These consist of flat-bottomed boats which carry the necessary machinery for excavating the gravel and recovering the gold. When dredges are used on dry placers, or deposits away from the river, it is necessary first to dig a hole of sufficient size in which to build the dredge. Provision must be made to supply the dredge with a constant stream of water sufficient to float it and furnish the water which is lost in discharging the wet tailings at the rear. The dredge is equipped with powerful machinery, large excavating buckets closely attached to an endless chain consisting of large heavy bars of iron, a heavy cylindrical screen for separating the large bowlders and discharging them over the side of the boat, sluices quite similar to those used in hydraulic mining, and a tailings stacker at the stern of the boat which disposes of the gravel after the gold has been recovered. This method of placer mining is largely practiced in Australia and California, and is rapidly being introduced into Alaska and Central America.

Quartz Mining. The mining of gold veins is conducted in much the same way as that of other metalliferous veins. Shafts are sunk, drifts are driven laterally on the vein from the shafts, and the method of breaking and handling the ore is determined by the size of the ore body, inclination or dip, and local conditions. In a few cases tunnels on the ore body are driven, or cross-cut tunnels through the barren rock are driven to the ore body. After the ore body is opened up or developed, the ore is blasted, loaded into cars, trammed or transported to the shaft, and hoisted to the surface, where the ore is delivered for metallurgical treatment.

METALLURGY

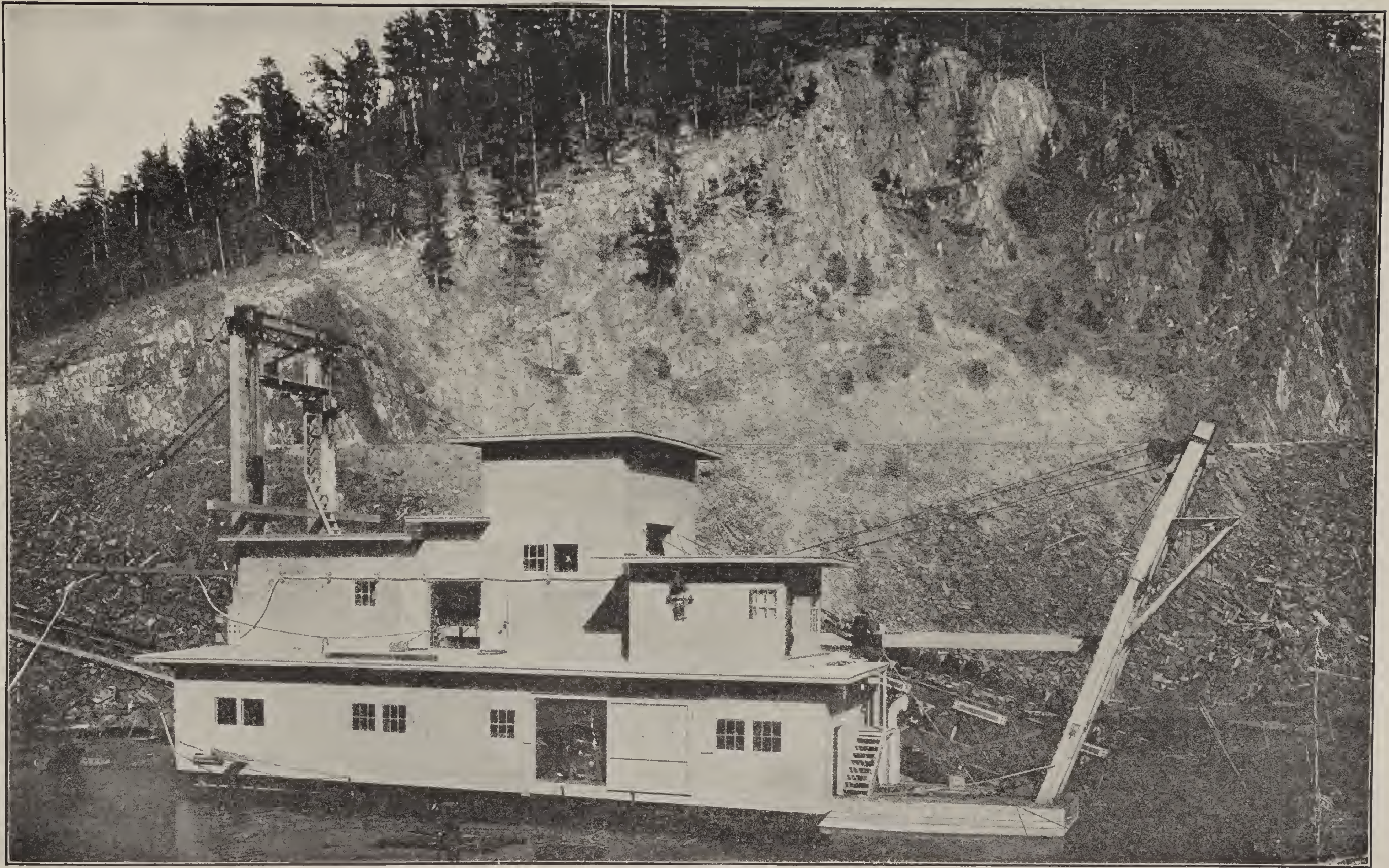
The method of extracting gold from the ores depends on the character of the ore and the location of the property. Heavy gold sulphide ores, such as copper, lead, etc., are smelted. Ores containing only a small percentage of sulphides with free gold or gold finely disseminated in the sulphides are usually treated at the property by amalgamation or cyaniding, or a combination of both. Progress has been very rapid in recent years, and processes such as the chlorination have been almost, if not wholly, replaced by the cyanide process. The reader is referred to publications on gold metallurgy for detailed descriptions of these several processes. Briefly, the chlorination process consists of converting the insoluble gold into the soluble chloride of gold, leaching with water, and precipitating the gold with a suitable precipitant, such as charcoal, sulphate of iron, or sulphuretted hydrogen.

Stamp Milling and Amalgamation. This process, which is the oldest method of crushing ores for the extraction of gold, is still in use to-day, and the modern stamp mill owes much to South Africa for its existence. It has been threatened many times by new machines and in many cases of gold milling has been replaced; where amalgamation is necessary for the recovery of the gold, or a portion of the gold, the stamp mill is always found as the preliminary crusher. (For a detailed description of the construction of the stamp mill, see GRINDING, CRUSHING, AND PULVERIZING MACHINERY.)

The stamp mill is usually the preliminary crusher to amalgamation; the ore, as delivered from the mine cars, first enters the ore bin, from which it is fed to breakers and broken to fragments about 1½ to 2 inches in size; from the breakers the ore is again transported to the ore bins immediately in the rear of the stamp mill; from these bins the ore is fed mechanically, together with a stream of water, to the stamp mill to be crushed; and the crushed product is splashed through a screen to the amalgamated plates, or apron plates, placed directly in front of the mill for recovery of the gold by amalgamation. The process of extraction by amalgamation consists of crushing the ore sufficiently fine to liberate or free the native gold and then catch the gold in mercury. The gold does not combine chemically with the mercury, but amalgamates with it, forming a stiff pasty mass known as amalgam. In stamp milling, copper or silver-plated copper plates covered with mercury are used for catching the gold. The plates may be located inside of the stamp battery or housing surrounding the stamps, suspended in front of the discharge screen, when it is known as the splash plate, and in front of the stamp battery, placed at a slight angle to permit the pulverized ore to be washed over; in the latter case they are known as apron plates. The length of the apron plates varies greatly, but the width is regulated by the width of the mortar. To prepare the amalgamating plates they are first thoroughly washed, and all grease spots, if any, removed; mercury is then sprinkled on and rubbed into the plate—with copper plates sodium amalgam is often used for this purpose; all excess of mercury is removed with a stiff brush; this leaves the plates bright with a thin coating of mercury. The pulverized ore is then washed across the plates from the stamp battery, and the free or native gold adheres to the mercury; more mercury is sprinkled on the plates as required. At certain periods the amalgam is scraped off the plates and the gold separated, as described later.

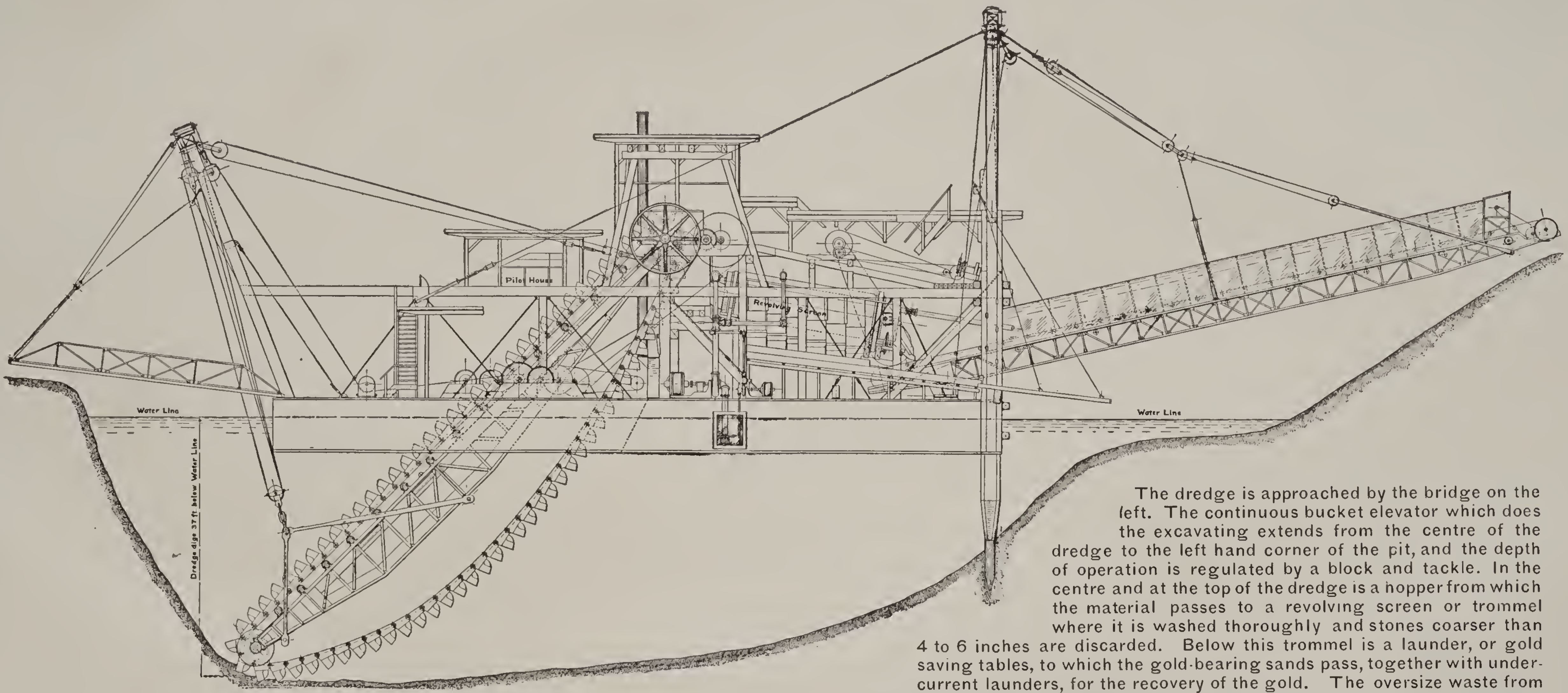
Pan amalgamation has been largely used, but at present it has been replaced to a large extent by other processes. Pan amalgamation consists of feeding comparatively fine ore or concentrates to a grinding pan, adding the proper amount of mercury, and pulverizing the ore in close contact with the mercury; following this operation, the grinding muller is raised off the bottom, the pulp diluted, and more mercury added to collect any suspended amalgam; the amalgam sinks to the bottom of the pan and is drawn off. Investigations have shown that amalgam containing coarse gold carries a higher percentage of gold than that containing fine gold, although the physical characteristics appear to be the same. In recovering the gold from the mercury the amalgam is placed in a large wedgwood mortar, more mercury added to reduce the plasticity, and then hot water is added, and the amalgam washed by working with the pestle; sand and foreign matter is by

GOLD MINING



A GOLD DREDGE

THE ABOVE VIEW ILLUSTRATES THE METHOD OF MINING THE GOLD-BEARING SANDS SITUATED ALONG RIVER AND CREEK BOTTOMS IN SUCH REGIONS AS ALASKA AND CALIFORNIA. THE DREDGE ILLUSTRATED IS OF FIVE CUBIC FEET CAPACITY OF THE CONTINUOUS BUCKET ELEVATOR TYPE, AND IS CAPABLE OF DIGGING THIRTY-SEVEN FEET BELOW THE WATER LINE



The dredge is approached by the bridge on the left. The continuous bucket elevator which does the excavating extends from the centre of the dredge to the left hand corner of the pit, and the depth of operation is regulated by a block and tackle. In the centre and at the top of the dredge is a hopper from which the material passes to a revolving screen or trommel where it is washed thoroughly and stones coarser than 4 to 6 inches are discarded. Below this trommel is a launder, or gold saving tables, to which the gold-bearing sands pass, together with under-current launders, for the recovery of the gold. The oversize waste from the trommel is discharged from the side of the dredge into the pit; the under-size from the trommel, after the gold has been extracted, is delivered to the tailings stacker consisting of an endless belt, shown on the extreme right. The dredge is held in position or anchored by means of a spud located at the stern of the dredge; the position of the bow is changed by means of two guy lines fastened to stakes in the ground in front of the dredge.

CROSS-SECTION OF A MODERN ELECTRICALLY-DRIVEN GOLD DREDGE, SHOWING METHOD OF OPERATION this means removed. The clean amalgam is then placed in a chamois bag, and the excess mercury squeezed out, leaving a hard amalgam; this hard amalgam is made into balls, covered with paper to prevent the gold sticking to adjacent balls or the sides of the iron retort, and retorted. The temperature of the retort is slowly increased so as to prevent too rapid distillation of the mercury. The mercury vapor is passed through condensing tubes and recovered. The remaining gold is then melted into bars, assayed, and shipped to the mint. The purity of the gold brick is reported in parts in 1000, such as 627 fine in gold, and 258 fine in silver; the balance of 115 would represent base metal, such as copper. The pulverized rock from the stamp mill, after being washed across the apron plates, is known as plate tailings. In most cases the plate tailings contain sufficient gold to warrant further treatment. The method adopted to recover this gold depends upon the value and character of the tailings. When the ore contains auriferous sulphides, the tailings are usually concentrated; when the tailings are comparatively free from sulphides, the gold is usually extracted by dissolving it in cyanide solution; in many cases a combination of concentration followed by cyaniding is used. The concentrates produced are either shipped to the smelter or treated on the property, depending on local conditions.

Cyanide Process. That gold was soluble in cyanide solution had been known for many years before a commercial process based on this principle was developed for recovering the metal from the ores. The first attempt to use this process commercially was made by J. H. Rae, who secured patents from the United States in 1867; Rae's process made use of the electric current in connection with a solution of cyanide salts. In 1885 J. W. Simpson, of New Jersey, proposed using a 3 per cent solution of cyanide together with a small percentage of ammonium carbonate. In the following year (1886) J. S. MacArthur and R. W. and William Forrest, of Glasgow, started their experiments and were finally successful in commercializing the process which for many years was known as the MacArthur-Forrest process. It was in 1890 that the MacArthur-Forrest process was introduced into South Africa to replace the chlorination process, which up to that time had been the standard method of extracting gold. The chief advantages which the cyanide process offered over the chlorination process were reduction in cost of operation by eliminating the preliminary roasting and the recovery of the silver with the gold by one leaching. The process is dependent upon the fact that very fine particles of gold, or exceedingly fine sheets of gold, are rapidly soluble in a weak solution of potassium cyanide in the presence of free oxygen; coarse gold is practically insoluble in such a solution, as it is necessary to bring in contact with the gold free oxygen for the reaction to take place. At first solutions containing from 1 to 2 per cent of potassium cyanide were used, but it was soon found that weaker solutions dissolved the gold in practically the same length of time and greatly reduced the cost of chemicals required; the first, or the strong solutions, now vary from 0.1 to 0.2 per cent, depending on local conditions. It was in South Africa that this process was commercially developed, and the first few volumes of the *Transactions of the South African Mining Society* are mostly confined to the cyaniding process.

The process as developed in South Africa consisted of stamp milling followed by amalgamation; the tailings from the amalgamating plates were then classified into sands and slimes and treated separately. The sands were conveyed into large cylindrical shallow tanks holding many tons; the cyanide solution was then introduced under pressure through the bottom of the tank and allowed to permeate the sands until the surface of the tank was covered with solution; after a few hours the solution was drawn from the bottom of the tank and fresh solution added to the top of the tank. After such treatment for several days, wash water was added to the top of the tank to replace the gold solution and wash the sands of any dissolved gold. The slimes were conveyed to large settling tanks and allowed to settle, followed by decantation of the water; cyanide solution was then added, and the slimes agitated by mechanical means for several hours, allowed to settle, and the gold-bearing cyanide solution decanted. This operation was repeated until the soluble gold had been extracted from the slimes. Following this treatment, the slimes were washed as free as possible of any dissolved gold. This method of treating the slimes required large tankage and considerable time, and was soon improved upon in the United States by the invention of the Moore filter, and many other filters using the principle suggested by George Moore.

The Moore process consists of adding cyanide solution to the slimes, conveying the slimes to a filter tank, collecting a cake of slimes on the filter leaves by vacuum, transferring the filter leaves containing the cake, while the vacuum is on, to a second tank containing wash water, replacing the gold solutions in the slimes by wash water, and finally transferring the leaves containing the washed filter cake to a third tank, where the slimes are discharged from the filter leaves by introducing compressed air into the leaf in place of the vacuum. By this process the original tankage investment has been minimized and a much better extraction obtained from the slimes. Recently this latter process has been greatly improved by the introduction of the Dorr countercurrent settling tanks, followed by the Moore-Oliver filter. These tanks are the invention of J. V. N. Dorr and have met with success throughout the United States. In this process the slimes travel through a series of tanks in an opposite direction to the cyanide solution, and the process is known as the Dorr countercurrent cyanide process. The slimes from the last tank are thickened and fed to a rotary filter. This rotary filter is a large revolving cylinder the surface of which consists of vacuum chambers connected to a central vacuum and pressure valve on the shaft. The vacuum chambers are covered with woven wire, cocoa matting, canvas, and wound spirally with wire. The surface of the cylinder with the vacuum attached is slightly immersed in the thickened slimes; the slimes adhering to the cylinder are elevated by the revolving of the cylinder, washed with a spray of water near the top of the cylinder, and are discharged after washing by a scraper; immediately preceding the scraper the vacuum is replaced by compressed air. The advantage which this process offers is that it is continuous and less expensive to operate. The soluble gold and silver go into solution as a double cyanide with the potash. The gold from this solution is extracted by passing the solution over zinc shavings. In many mills this method of precipitation has been replaced by the introduction of zinc dust into the cyanide solution as it is conveyed to filter presses. The gold and silver are precipitated as a fine black powder. This precipitate is then treated with dilute sulphuric acid to dissolve any small pieces of zinc and pumped to a filter press. The cake obtained in the filter press, consisting of practically pure gold and silver, is then dried, mixed with the proper fluxes, and melted in graphite crucibles. The gold and silver obtained after melting is cast into bars and shipped to the mint.

Extraction by Washing. Extraction of gold by washing alone is possible only in the case of ores carrying native gold. Hydraulicking and dredging are the two commercial methods. Hand operations are only practiced when the pockets of ore are very rich and too small to warrant the erection of a plant; a mine of this character was being operated in Australia in 1912. For testing the value of placer ground the gravel obtained from drilling is washed by hand; prospectors also make use of the "gold pan" to test samples and specimens of rock for free gold. In uncivilized countries hand washing is often practiced. Unless carefully conducted the losses by hand washing are liable to be very heavy. Hand washing may be performed by means of pans, cradles, long toms, and sluices. The operation of panning is the simplest and consists of placing the material in a flat-bottomed pan, known as a "gold pan," the sides of which slope at an angle of about 60°. The pan is then placed under the surface of the water, and an oscillating motion given to it, so that the free gold will settle, and the mud and fine sand will wash over the edge, which is gradually lowered until there is little left in the pan other than the heavy minerals and gold. The pan is then lifted and shaken so as to spread out the material, when the yellow specks, or "colors," of gold are visible. The cradle is a box provided with a sieve at the feed end, the whole resting on rockers so that it can be rocked by means of a handle. The gold-bearing mineral is placed on the sieve and washed with water, the coarse particles being removed from the sieve by hand and the fine particles, together with the gold, passing through and falling on an inclined bottom, where the light material runs off with the water, and the heavier gold sinks to the bottom and is retained by transverse slats known as riffles. The long tom consists of two troughs, the lower one of which has cross riffles on its inclined bottom. The upper trough is about 14 feet long by 20 inches wide at the upper end and 30 inches wide at the lower end, which is closed by a sieve. The lower end of the upper trough discharges into the upper end of the lower trough. The lower trough is about 12 feet long by 3 feet wide, and by means of a strong stream of water flowing in at the upper end of the upper trough the material is washed through both troughs, the gold being caught in the riffles in the lower box and the coarse material being discharged by hand from the upper box.

Parting. As the greater part of the gold produced by the preceding processes carries silver (see SILVER), the parting of the gold from the silver is an important process in the metallurgy of gold. Parting is performed in what are known as the dry way and the wet way and by electrolysis. The dry method of parting depends upon the fact that silver can be converted into sulphide or chloride, while gold is attacked by neither sulphur nor chlorine at high temperature. The wet method depends upon the solubility of silver and the insolubility of gold in nitric acid and in boiling concentrated sulphuric acid. The electrolytic method depends upon the property of silver to pass from a bar of gold-silver alloy employed as an anode to the cathode, when the two poles are immersed in an acidulated solution of nitrate of silver, and an electric current established. The wet process, using sulphuric acid as the solvent, and the electrolytic process are the two parting processes most employed at present. For a full treatment of the metallurgy of gold, consult Schnabel, *Handbook of Metallurgy*, translated (New York, 1889), and Egleston, *The Metallurgy of Silver, Gold, and Mercury in the United States* (ib., 1887).

Commercial Uses. It is estimated by competent authorities that about one-fourth of the annual production of gold is employed in coinage, the remainder being consumed in the arts and in making good the annual loss from various causes. The purposes for which gold is employed in the arts are familiar to every one. Some of the items are jewelry plate, gold leaf, gilding, etc.

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GOLDAU, gôl′dou. A village in the Canton of Schwyz, Switzerland. It was formerly situated between Mount Rigi and the Rossberg and was the scene of the terrible landslide from the Rossberg, Sept. 2, 1806, which destroyed Goldau and three other villages, burying 457 people and filling up part of Lauwerz Lake. The present village of Goldau, built near the mines, contains a population of about 500.

GOLDBEATER'S SKIN. A delicate membrane prepared from the cæcum, or blind gut, of the ox, and used as the fabric for court-plaster, etc., but chiefly by goldbeaters. The outer or peritoneal membrane is used for this purpose. The intestine is first subjected to a partial putrefaction, by which the adhesion of the membranes is sufficiently diminished to enable them to be separated; the separated membrane is then further cleaned from adhering muscular fibres, dried, beaten, and pressed between paper, besides being treated with camphor or alum, isinglass, and white of egg, the object of which is to obtain the pure continuous membrane free from grease and impurities and thus prevent weakening by putrefactive processes. When thus prepared, goldbeater's skin may be beaten continuously for several months with a 12-pound hammer without material injury. The intestines of about 380 oxen are required to furnish the 950 leaves that form one packet, or *mold*, as it is technically called. The manufacture is extremely offensive. Chlorine has been introduced both as a disinfectant and to assist in the separation of the membrane.

GOLDBEATING. The process by which gold is hammered into thin leaves. The use of gold leaf for gilding is a very ancient art, having been practiced by the Egyptians and Greeks many centuries before the Christian era, and gold used for this purpose is usually alloyed with silver or copper, according to the color required. The consumption of gold leaf by dentists is also general, as the material in this form is extensively used for fillings. As gold leaf is not sold by weight, but by superficial measure, and as increasing the quantity of alloy diminishes the malleability, there is but little temptation to use the baser metals as an adulteration. The gold, which is first alloyed with a small amount of pure copper and silver, 12 grains of each to the ounce of gold 998 fine, is first cast into oblong ingots or bars about 1 inch wide. The ingot or bar is flattened out into a ribbon of about $\frac{1}{800}$ of an inch in thickness by passing it between polished steel rollers until it is about 24 feet long and weighs about 55 pennyweights. This is annealed or softened by heat, and then cut into 210 pieces approximately 1 inch square; these are placed between leaves of vellum or tough paper specially made in France, each piece of gold in the centre of a square leaf, another placed above, and so on till the pile of 210 is formed. This pile, called a cutch, is inclosed in a double parchment case, placed upon a marble block, and beaten with a 16-pound hammer. The elasticity of the packet considerably lightens the labor of beating, by causing the hammer to rebound with each blow.

The beating is continued until the inch pieces are spread out to 3½-inch squares; they are then taken out and cut into four pieces. The squares thus produced are now placed between layers of goldbeater's skin (q.v.), instead of vellum, made into piles, and inclosed in a parchment case, and beaten as before, but with a lighter hammer weighing about 10 pounds. Another quartering and beating produces 3360 leaves, each with a thickness of about $\frac{1}{200000}$ of an inch. An ounce of gold is thus extended to a surface of about 100 square feet. A still greater degree of thinness may be obtained, but not profitably. A thinness has been attained of 367,500 leaves to the square inch, and a grain of gold is thus made to cover 52 square inches. After the last beating the leaves are taken up with wooden pincers, and a tool called a "wagon," placed on a cushion, blown out flat, and their ragged edges cut away, by which they are reduced to squares of 3¼ inches. Twenty-five of these are placed between the leaves of a paper book, previously rubbed with red chalk to prevent adhesion of the gold, and are sold in this form, 20 books being included in a pack. It is stated that an amount of gold weighing 4 pennyweights 6 grains and worth $4.25 commands at wholesale, in the form of a pack of gold leaf, about $7.25. Attempts have been made to apply machinery to goldbeating, but its application is very limited; and most of the gold leaf is still beaten by hand.

GOLD BUG, The. One of the most noted of Poe's tales (1843). The scene is the vicinity of Charleston, S. C., where a recluse, Legrand, locates an enormous treasure in gold and jewels by means of an intricate cipher found on an old parchment.

GOLD CARP. See Goldfish.

GOLD COAST. A British Crown colony in West Africa, extending along the Gulf of Guinea about 334 miles, and bounded by the French colony of the upper Senegal and Niger on the north (about the parallel of 11° N. lat.), Togoland on the east, and the French Ivory Coast on the west (Map: Africa, D 4). The area of the colony excluding the Northern Territory and Ashanti (q.v.) is estimated at 25,000 square miles; the total area, 80,253 square miles. The coast region is rather low, with rocky cliffs lining the shores and reaching a height of 2000 feet. The interior is mountainous. In the southeast is the Akuapem Range. South of it runs the Adanse Range, covered with dense forests and constituting a great natural barrier along the coast district. The western part of the interior is generally hilly; the eastern part is formed mainly of extensive terraces. The chief rivers flowing south are the Volta, which is a part of the German boundary line, the navigable Ankobra, emptying into the sea near Axim, the Pra, and the Toji. The climate of the colony, although not so deadly as that of the west coast, is very unhealthful for Europeans. April is the hottest month. There are two rainy seasons—from April to August and from October to the end of December. The rainfall varies along the coast, being heavy in the west, 79 inches per year, and light in the east, 27 inches. Impassable forests of palms, gum trees, and the giant karkum seriously interfere with the development of the interior. The level regions in the south, and the savannas north of the Akuapem Mountains, are overrun with herds of elephants, buffaloes, and other wild animals.

The soil is of great fertility, producing coffee, cacao, tobacco, cotton, and other tropical products. Agriculture has received little attention, but a botanical station at Aburi aids in the cultivation of colonial products—coconut, rubber, cocoa, coffee, cotton, pepper, nutmeg, pimento, and croton. The chief products are derived from the forests and mines. The trade of the colony is prosperous and increasing. Imports increased from £2,125,464 in 1902 to £4,023,322 in 1912, and exports from £774,186 to £4,307,802. In 1912 imports from the United Kingdom amounted to £2,622,932, and exports thereto, £2,680,973. The chief exports in 1911 were: cacao, £1,613,468; gold and gold dust, £1,071,616; rubber, £219,447; palm kernels, £175,891; lumber, £138,821; palm oil, £128,916. Gold, both alluvial deposits and quartz, is widely diffused throughout the colony, Ashanti, and some parts of the Northern Territories. The output was 281,257 ounces (valued at £1,194,743) in 1908; 253,976 ounces (£1,079,024) in 1911; 352,957 ounces (£1,499,469) in 1912. Shipping entered and cleared in the foreign trade, in 1912, 2,849,248 tons. There is a government railway from Seccondee on the coast to Coomassie, 168 miles; and a line is in operation between Accra and Mangoase, 40 miles. Road construction is progressing rapidly. There are about 1500 miles of telegraph line, and at Accra is a wireless telegraph station. The colony is administered by a governor, and by an executive and legislative council, the members of which are chosen from officials and colonial merchants. The colony proper is divided into three provinces—Western, Central, and Eastern—each under a commissioner; Ashanti and the Northern Territories are each under a chief commissioner. Revenue and expenditure in 1902 were £511,502 and £547,607 respectively; in 1907, £708,718 and £617,124; in 1911, £1,111,632 and £914,501; in 1912, £1,230,850 and £1,157,091.

The negro inhabitants are divided into a large number of tribes more or less independent of each other, but with similar customs and forms of government. As education and civilization spread, there is an increasing tendency to tribal disintegration. The population in 1911 was probably in excess of the census returns of that year. The census disclosed 1,503,386 inhabitants, divided as follows: the colony, 853,766; Ashanti, 287,814; the Northern Territories, 361,806. Europeans numbered 1700. In 1912 there were 11 government primary schools and 148 assisted schools controlled by various Christian religious bodies; enrollment in primary and secondary schools, 18,524; average attendance, 14,113. The chief towns include Accra, the capital (pop., 19,585 in 1911), Coomassie, the capital of Ashanti (18,853), Cape Coast Castle (11,364), Seccondee (7725), Saltpond, Quittah, Winnebah, Akuse, Axim, and Aburi. There are a large number of small towns, with populations ranging between 2000 and 5000.

The Gold Coast is thought to have been discovered by the Portuguese in 1470. In 1481 a Portuguese colony of about 700 men under Diogo d'Asambuja landed at the present seaport of Elmina, and erected the fort of St. George. The Dutch by 1642 had succeeded in driving away the Portuguese. Meanwhile the English began to arrive, but their first attempts at establishing themselves were frustrated by the Dutch. After the establishment of the Royal African Company in 1672, the English succeeded in erecting a number of forts on the coast and soon concluded an alliance with the Fanti, whose old enemies, the Ashanti, had allied themselves with the Dutch. The slave trade was the chief source of commerce. In 1821 the English possessions on the Gold Coast were taken out of the hands of the African Company of Merchants, who had succeeded the previous monopoly, and made a dependency of Sierra Leone. The Fanti, with the aid of the British, decisively defeated the Ashanti in 1826, and in 1831 the rule of England was recognized over the territory lying south of the upper Pra. In 1872 the Dutch ceded their holdings to the British for trading privileges, and since then the rule of the English has been supreme in the Gold Coast. In 1874 the territory was made a crown colony distinct from Sierra Leone. For a further account, see ASHANTI. Consult: Macdonald, *The Gold Coast, Past and Present* (London, 1898); Reindorf, *History of the Gold Coast and Ashanti* (Basel, 1895); H. W. Redwar, *Comments on some Ordinances of the Gold Coast Colony* (London, 1909); John Lang, *The Land of the Golden Trade* (Edinburgh, 1913); C. P. Lucas, *Historical Geography of the British Colonies*, vol. iii (3d ed., Oxford, 1914).

GOLD′CREST′ (so called from the yellow spot on its head), GOLDEN-CRESTED WREN, or FIRECREST. English names for European species of kinglets. See KINGLET.

GOLD′EN. A city and the county seat of Jefferson Co., Colo., 16 miles by rail west of Denver, on Clear Creek, and on the Colorado and Southern and the Denver and Inter-Mountain railroads (Map: Colorado, D 2). It is the seat of the Colorado School of Mines, opened in 1874, and of the State Industrial School for boys. There are extensive deposits of coal and clay in the vicinity, and the city has smelting works, a brewery, and manufactures of pressed and fire brick, tile, pottery, flour, etc. The water works are owned by the city. Pop., 1900, 2152; 1910, 2477.

GOLDEN AGE. In Greek and Roman mythology the earliest of the four ages; the ideal period when the earth, under Saturn's reign, produced fruits without cultivation, when there was no warfare, and man lived in perfect happiness before sin entered the world. The characteristics of the golden age, and of the ages of silver, brass, and iron which followed, are described in the first book of Ovid's *Metamorphoses*. The term is used to represent the period of highest development in literature, art, and history. Consult K. F. Smith, "Ages of the World (Greek and Roman)," in Hastings, *Encyclopædia of Religion and Ethics*, vol. iv (New York, 1908). See AGE; SATURN.

GOLDEN APPLE. See PARIS.

GOLDEN ASS (Lat. *Asinus Aureus*). A fable or romance written by Apuleius, a Latin writer of the second century. The work is entitled *The Metamorphoses, or the Golden Ass*, and was modeled after a similar work by Lucian, which Apuleius paraphrased and embellished with other tales, among which the one best known is that of Cupid and Psyche. The hero is punished for his curiosity by being changed into an ass, but after a series of most wonderful adventures he is purified and resumes his natural form. This story is thought by some to have been written as a satire on priests, magicians, and debauchees. The moral and religious conditions of Apuleius' time are portrayed with much humor and truth. The language, although abounding in clever turns, often contains obsolete and provincial phrases. The *editio princeps* was published in Rome in 1469. The story of *Cupid and Psyche* was first translated in 1566, by Adlington; this translation was republished in 1887 with an introduction by Andrew Lang. For further bibliography, see APULEIUS.

GOLDEN BEETLE. The golden beetles (family Chrysomelidæ, tribe Cassidini) are among the most beautifully colored of all beetles. They are usually small, with a gold or greenish iridescence which in many species fades completely as soon as the insect dies, so that museum collections give no conception of the beauty of these beetles when alive and on their food plant; but the brilliancy is said to vary with the excitation of the beetle. They are flattened below and convex above, hence they have also been named tortoise beetles. The margins of the prothorax and elytra are expanded so as to form an oval flat frame about the convex part of the beetle. Both the adults and the larvæ of *Cassida*, or *Coptocycla*, *aurichalcea* feed on the morning-glory and sweet potato, and a large yellow and black species feeds on the sunflower. The caudal end of the larva is forked, and to it are retained the molted skin and frass, which are held up over the body like a shield. Pupation takes place on the underside of the leaves of the food plant.

GOLDEN BELL. See Forsythia.

GOLDEN BIBLE. A name given on its pretended discovery to the Book of Mormon, which was described as being written on sheets of metal resembling gold.

GOLDEN BOOK. See Libro d'oro.

GOLDEN BULL (Lat. *bulla aurea*, so called from the gold case in which the seal attached to the bull was inclosed). The Imperial edict issued by the Emperor Charles IV, in 1356, for the purpose of settling the form of the Imperial election and coronation, the persons to whom the right of election belonged, and their duties and privileges. Up to that time some uncertainty had prevailed as to the rights of the electoral body, claims having frequently been made by several members of the lay electoral families and divisions having repeatedly arisen from this uncertainty; the effect of such divisions being to throw the decision for the most part into the hands of the Pope. In order to obviate these inconveniences, the Golden Bull defines that one member only of each electoral house shall have a vote, viz., the representative of that house in right of primogeniture, and, in case of his being a minor, the eldest of his uncles paternal. The seven electors were declared to be the archbishops of Mainz, Trèves, and Cologne, the King of Bohemia, the Count Palatine of the Rhine, the Duke of Saxony, and the Margrave of Brandenburg. The place of election of the Emperor was fixed at Frankfort; the coronation was to take place at Aix-la-Chapelle. On the great question as to the dependence of the Imperial office on the Pope, and as to the right of the Pope to examine and approve the Imperial election, the Golden Bull is silent, although it declares the Emperor competent to exercise jurisdiction in Germany from the moment of election. It invests the vicariate, together with the government of the Empire during an interregnum, in the Elector Palatine and the Elector of Saxony; but it is to be noted that this applies only to Germany. Of the vicariate of Italy, which was claimed by the popes, nothing is said. The Golden Bull also contains some provisions restraining the so-called *Faustrecht* (lit. 'fist law,' or right of private redress). It was promulgated in a diet at Nuremberg in 1356 and ratified at Metz in the same year, and original copies of it were furnished to each of the electors and to the city of Frankfort. The electoral constitution, as settled by this bull, save for the number of electors, was maintained almost unaltered till the extinction of the Empire. There is a translation into English of the Golden Bull in Henderson, *Historical Documents of the Middle Ages* (London, 1892). In Hungarian history there is a constitutional edict called by the same name. It was issued by Andrew II in 1222. It strengthened the monarchy, although limiting its functions. It contained guarantees of individual liberty and insured periodical meetings of the assemblies. It preserved the power of the nobles by preventing further subdivisions of fiefs. Consult Hahn, *Ursprung und Bedeutung, der Goldenen Bulle Karls IV* (Breslau, 1902).

GOLDEN CALF. The molten image fashioned, according to Ex. xxxii. 2 et seq., at Sinai by Aaron. When requested by the Israelites to make a god for them, he demanded their golden earrings, made of them a molten image, and said (so 2 Hebrew Manuscripts and the Greek), "This is thy god, O Israel, who brought thee up out of the land of Egypt." The Masoretic text, supported by the versions, reads: "These are thy gods"; but the singular is used in Neh. ix. 18, where the words are quoted, and the plural is manifestly a later change intended to suggest the heathenish character of the bull worship. As Aaron says: "There will be a festival to Yahwe to-morrow," there can be no question as to whose image the golden calf was intended to be. It was ground to powder by Moses; the people were obliged to drink it, mixed with water; and 3000 were slain by the Levites to atone for the sin. The narrative points to the existence of the worship of Yahwe under the form of a bull among the Hebrews. For this there is abundant evidence. Images of bulls overlaid with gold stood in the ancient sanctuaries at Dan and Bethel, though this cult is not traced further back than the days of Jeroboam (1 Kings xii. 28 et seq.; 2 Kings x. 29). In Samaria likewise the bull cult was introduced (Hos. viii. 5). In the temple at Jerusalem there were also images of bulls. The brazen sea, representing the primeval ocean, rested on oxen; and in the Holy of Holies gold-covered images of winged bulls (see Cherub) stood on the lid of the sacred chest. (See Ark of the Covenant.) It is difficult to say, however, how far these were regarded as representations of Yahwe. The story of Aaron's making a golden calf may have been told originally to establish the antiquity of the bull cult and its legitimacy as a part of the worship of Yahwe; but in the hands of redactors, who were opposed to all image worship, the story was reshaped so as to make it appear that Aaron in reality committed a grievous sin for which atonement had to be made.

GOLDEN CHAIN. See Laburnum.

GOLDEN CIRCLE, Knights of. See Knights of the Golden Circle.

GOLDEN CROSS, United Order of. A fraternal organization, founded in 1876. It had, in 1913, 11 grand commanderies and 488 subordinate commanderies. Its members numbered about 171,000. The order has disbursed since its organization a total of $11,650,032. The disbursements for each year average about $400,000.

GOLDEN-CROWNED SPARROW. A large and sprightly sparrow (*Zonotrichia coronata*) of northwestern America, distinguished by a broad stripe of yellow on the crown of the head. It is related to the familiar white-throated and white-crowned sparrows of the Eastern States and like them has a most pleasing song. It breeds along the coast from northern California to Alaska, nesting on the ground, and is widely migratory.

GOLDEN-CROWNED THRUSH (so called from the yellow spot on its head), or Wagtail (q.v.). An American wood warbler (*Seiurus aurocapillus*). See Ovenbird.

GOLDEN-CROWNED WREN. See Kinglet.

GOLDEN EAGLE. See Eagle.

GOLD′EN-EYE′. A duck of the genus *Clangula,* having the bill shorter than the head and the nostrils well forward; a garrot. The typical species (*Clangula clangula americana*) is a common winter visitant, appearing in small flocks, most frequently in severe weather, not only in estuaries, but on the lakes and rivers of inland parts of North America, as it does on those of all the central and southern parts of Europe, and equally on those of the temperate parts of Asia. The wings are pointed and rather short, with the first quill the longest, and the tail of 16 feathers is rounded and of medium length. In the male the coloration is pied black and white, while it is brown and white in the female. The golden-eye takes its name from the golden-yellow hue of the iris, and the male may be recognized by the metallic green of the head and upper neck, the white patch at the base of the beak below the eye, and by the scapular region being striped with white. The length of the European bird is about 18 inches; the American form (*americana*) is somewhat larger. A second North American species is Barrow's, or the Rocky Mountain golden-eye (*Clangula islandica*), which is larger and has the white loral spot more extended; it is more northerly and less numerous than the other. Though classed among the sea ducks, and like them subsisting largely on animal food, these ducks are scattered inland all over the continent, and are well known to gunners by sound as well as by sight, for their wings make a loud and characteristic whistling in flight; hence a common local name is "whistler," or "whistlewing." They go in small parties, mix with other ducks, especially bluebills, and are extremely watchful, often alarming their companions and leading the whole flock swiftly away before any other kind has suspected danger. They breed from Quebec and Dakota northward and throughout northern regions generally as far as trees go, making their nests of straw, feathers, etc., in cavities of dead trees and tall stumps, and laying 8 to 10 ashy-green eggs. Consult: Dresser, *Birds of Europe* (London, 1881); Job, *Among the Waterfowl* (New York, 1902); Oakley, *Wild Ducks: How to Rear and Shoot Them* (ib., 1905); Shaw, *Wild Fowl* (ib., 1905).

GOLDEN-EYED FLY. A lace-winged fly of the family Chrysopidæ, so called because in some lights the eye seems made of burnished gold. See Lacewing.

GOLDEN FLEECE. In Greek tradition, the fleece of the ram Chrysomallus, the recovery of which was the object of the Argonautic expedition. (See Argonauts.) The golden fleece has given its name to a celebrated order of knighthood in Austria and Spain, founded by Philip the Good, Duke of Burgundy, and sovereign of the Netherlands, at Bruges, on Jan. 10, 1430, on the occasion of his marriage with Isabella, daughter of King John I of Portugal. This order was instituted for the protection of the Church, and the fleece was probably assumed for its emblem as much from being the material of the staple manufacture of the Low Countries as from its connection with heroic times. The founder made himself grand master of the order, a dignity appointed to descend to his successors. This order ranks among the highest on the Continent. The knights were consulted before the sovereign undertook a war, and his deeds were subject to review by all the members of the order. After the death of Charles V the Burgundo-Spanish line of the house of Hapsburg remained in possession of the order; but at the close of the War of the Spanish Succession the Emperor Charles VI laid claim to it in virtue of his possession of the Belgian Netherlands and, taking with him the archives of the order, celebrated its inauguration with great magnificence at Vienna in 1713. Philip V of Spain contested the claim of Charles, and the dispute, several times renewed, was at last tacitly adjusted by the introduction of the order in both countries. In Austria the Emperor may now create any number of knights from the old nobility. In Spain princes, grandees, and personages of peculiar merit are alone eligible; if Protestants, the Pope's consent is required. The insignia are a golden fleece hanging from a gold and blue enameled flint stone emitting flames, and borne in its turn by a steel forming the letter B. On the enameled obverse is the legend *Pretium Laborum Non Vile* (No mean recompense for effort). The decoration was originally suspended from a chain of alternate firestones and rays, for which Charles V allowed a red ribbon to be substituted, and the chain is now worn only by the grand master. The costume consists of a robe of deep-red velvet, lined with white taffeta, and a long mantle of purple velvet lined with white satin and richly trimmed with embroidery, containing firestones and steels emitting flames and sparks. On the hem, which is of white satin, is embroidered in gold *Je l'ay empris* (I have dared it). There is also a cap of purple velvet embroidered in gold, with a hood; the shoes and stockings are red. Consult Paul, "The Order of the Golden Fleece," in *Scottish Historical Review* (Glasgow, 1908). See Orders.

GOLDEN GATE, The. See San Francisco Bay.

GOLDEN HORDE. The name (1) of a great body of Tatars who, under Batu Khan, grandson of Genghis Khan, overran eastern Europe; and (2) of the khanate, or empire, which they established on the banks of the Volga, and which is also known as Kiptchak (q.v.). The army led by Batu (known also as Sain Khan, 'the good prince,' and described by Marco Polo as "a very puissant king") was one of three sent out in 1235 by Ogotai Khan, the successor of Genghis. Crossing the Ural River in 1237, they invaded Russia, penetrating to the very centre of the country, pillaging, burning, devastating, and murdering, defeating army after army, and showing no mercy. Moscow and Kiev and other cities were taken and burned, and their inhabitants put to the sword. From Russia they passed into Poland, Silesia, and Hungary, carrying devastation and bloodshed everywhere. Lublin and Cracow were destroyed in 1240, Breslau was burned in 1241, and at Liegnitz, on the field since known as the Wahlstatt, an army of Silesians, Poles, and Teutonic knights, under Henry II, Duke of Silesia, was overcome, although with great loss to the victors, April 9, 1241. Unsuccessful in the siege of Neustadt, the Horde turned eastward, and Batu pitched his gorgeously embroidered silk tent (which gave rise to the name "Golden") on the banks of the Volga, and summoned the Russian princes to his presence to do him homage. This settlement was called *Sir Orda* (Golden Camp), from which originated the expression "Golden Horde." The empire established by him over the Russians was maintained until the power of the khans was broken by Ivan III towards the close of the fifteenth century. Consult: Lane-Poole, *Mohammedan Dynasties* (London, 1893); Howorth, *History of the Mongols* (ib., 1876–85); Schurtz, "Hochasien," in vol. ii of Helmolts, *Weltgeschichte* (Leipzig, 1902). See Kiptchak; Mongol Dynasties.

GOLDEN HORN. See Constantinople.

GOLDEN HOUSE OF NERO (Lat. *Aurea Domus*). A remarkable structure planned by Nero after the fire of 64 A.D., between the Palatine and the Esquiline hills, covering an area of a square mile. It embraced farms, vineyards, game preserves, sulphur and sea baths, ponds and waterfalls, and elaborate colonnades and halls, adorned with the most lavish expenditure. Among its celebrated features were a vestibule containing a colossal bronze statue of Nero, 120 feet in height; a portico 3000 feet long; and a banquet hall with a revolving ceiling of carved ivory representing the firmament. In other halls the ceilings dropped flowers and perfumes on the guests. The walls were incrusted with rare marbles, mosaics, mother-of-pearl, precious stones, and paintings, and the courts and apartments contained hundreds of rare columns and statues. The depression where the Coliseum now stands was occupied by a lake. The Golden House had been pulled down before 75 A.D., and its remains were used as foundations for later buildings, particularly for the baths of Trajan and Titus, while the grounds were given back to public use. Within the extensive remains of the Golden House excavations have again been made recently, by Weege; consult his article, "Das Goldene Haus des Nero," in *Jahrbuch des Kaiserlich Deutschen Archäologischen Instituts*, xxviii, 127–224 (Berlin, 1913), summarized by Winter, in *The Classical Weekly*, vii, 163–164 (New York, 1914).

GOLDEN HUMMER. A Peruvian humming bird (*Heliothrix aurita*), having a golden gloss upon its plumage. Also called black-eared fairy. See Colored Plate of Humming Birds.

GOLDEN LEGEND (Lat. *Legenda Aurea*). A celebrated collection of hagiology, which for a time enjoyed almost unexampled popularity, having passed through more than 100 editions, and translations into almost all the European languages. It is the work of James of Viraggio, better known as Jacobus de Voragine, who was born at Viraggio (now Varazze), on the coast, near Genoa, about the year 1230. He entered the Dominican Order (1244) and was provincial of the order in Lombardy from 1267 to 1286. In 1292 he became Archbishop of Genoa, and by his ability, moderation, and exemplary life he played a most influential part in the public affairs of his time. He died in Genoa in 1298. The *Legenda* consists of 177 sections, each of which is devoted to a particular saint or festival, selected according to the order of the calendar. It presents nearly the entire narrative portions of the Bible, with many homilies and much information, some curious, concerning Church characters. In its execution the work, as may be supposed from its age, is far from critical. It was primarily a book of devotion, and is deserving of study as a literary monument of the period and as illustrating the religious habits and views of the Christians at that time. The work, entitled *Legenda Sanctorum* by its author, is also called *Historia Longobardica*, because it appends a brief Lombard chronicle to the life of Pope Pelagius. A translation of the *Golden Legend* was made by William Caxton for the Earl of Arundel and first published in London (1483); it was reprinted, edited, and modernized by Ellis (London, 1900). The classical edition of the original Latin is by Graesse (Breslau, 1890).

GOLDEN LEGEND, The. A religious dramatic poem by Longfellow, published in 1851. With *New England Tragedies* and *The Divine Tragedy*, it forms a trilogy entitled *Christus*. It is a mediæval tale, faintly resembling *Faust*.

GOLDEN (or **CAPE**) **MOLE.** A member of a family of insectivores, Chrysochloridæ, confined to South Africa, having an external resemblance to, and the habits of, moles, but in structure more closely allied to the tenrecs and potamogales. They do not dig, as do the true moles, with forefeet modified into hands, but mainly with the enormous claws of the two middle fingers. They take their name from the brilliant and varying bronzed lustre of their fur.

GOLDEN NUMBER (Lat. *numerus aureus*). The number of any year in the Metonic cycle (q.v.). As this cycle embraces 19 years, the golden numbers range from 1 to 19. The cycle of Meton came into general use soon after its discovery, and the number of each year in the Metonic cycle was ordered to be engraved in letters of gold on pillars of marble. Since the introduction of the Gregorian calendar the point from which the golden numbers are reckoned is 1 B.C., as in that year the new moon fell on January 1; and as by Meton's law the new moon falls on the same day (January 1) every nineteenth year from that time, we obtain the following rule for finding the golden number for any particular year: *"Add one to the number of years, and divide by nineteen; the quotient gives the number of cycles, and the remainder gives the golden number for that year; and if there be no remainder, then nineteen is the golden number, and that year is the last of the cycle."* The golden number is used for determining the epact (q.v.) and the time for holding Easter (q.v.).

GOLDEN ORIOLE. Yellow being the characteristic color of orioles (as implied in the name), the adjective "golden" has been locally applied to many forms—as, e.g., to the American hangnests. Strictly it belongs only to the European true oriole (*Oriolus oriolus*). See Oriole.

GOLDEN PLOVER. See Plover.

GOLDEN RAIN. See Forsythia.

GOLD'ENROD' (*Solidago*). A genus of plants of the family Compositæ, closely allied to *Aster*. The species are natives chiefly of temperate climates and are most numerous in North America. A few are European; only one is British, the common goldenrod (*Solidago virgaurea*), a perennial plant of very variable size. At least 75 species are found in the United States, and because of its abundance, wide distribution, and showiness, many botanists and flower lovers claim for the goldenrod the distinction of being called the national flower. *Solidago bicolor* has cream-colored or nearly white flowers. *Solidago odora* (sweet goldenrod) yields an anisate odor when its leaves, which have even been used as a substitute for tea, are crushed. It contains a volatile oil which has been used in medicine as an aromatic, diaphoretic, and tonic. Blue-stemmed goldenrod (*Solidago cæsia*), and the varieties of *Solidago virgaurea, serotina, nemoralis,* and *racemosa,* are among the most interesting. Sheep readily eat various species of goldenrod, and as a forage it is considered valuable in parts of New York and elsewhere. When prepared in the same manner as hemp, the stalks of *Solidago canadensis,* which attain a height of 4 to 6 feet, are said to yield a strong fibre that might be utilized.

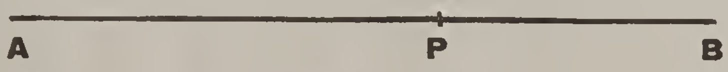
GOLDEN ROSE (Lat. *rosa aurea*). A rose formed of wrought gold and blessed with much solemnity by the Pope in person on the fourth Sunday of Lent, which is called, from the first word of the introit for the day, Lætare Sunday. The prayer of blessing contains a mystic allusion to Christ as "the flower of the field and the lily of the valley." The rose is anointed with balsam, fumigated with incense, sprinkled with musk, and is then left upon the altar until the conclusion of the mass. It is then usually presented to some Catholic prince or princess whom the Pope desires especially to honor, with an appropriate form of words. The origin of the ceremony is uncertain, but the most probable opinion as to its date is that of Martêne and Du Cange, who fix it in the pontificate of Innocent IV (1243–54). Consult Barry, *The Sacramentals* (Cincinnati, 1858). See Lætare Medal.

GOLDEN RULE, Regula Aurea, Rule of Three, Regula de Tribus, Merchants' Rule, and Regula Mercatorum. Terms once applied in arithmetic to designate the operation of simple proportion. See Proportion.

GOLDEN SEAL. See Hydrastis.

GOLDEN SEAL, Order of the. A fraternal insurance organization, incorporated under the laws of New York State in 1902. It is governed by a supreme court. Membership carries with it insurance against accident, sickness, and death. Every six years a distribution of the profits is made, and members receive a cash dividend. In 1914 there were about 500 local courts, with about 15,000 certificates of membership in good standing. The annual benefits distributed amount to about $1,000,000.

GOLDEN SECTION. A popular term for the division of a line segment in extreme and mean ratio. Given the line segment AB, if the point P is found such that $AB : AP = AP : PB$, or $AB \times PB = AP^2$, P is said to divide AB in golden section. The ratio of AP to PB is about 8 : 5. The theory of the golden section was known to the Pythagoreans and was used by them in the construction of the regular pentagon. Eudoxus (q.v.) discovered several theorems relating to it, some of these being in the nature of algebraic identities, as, e.g., that $(AP + \frac{1}{2}AB)^2 = 5(\frac{1}{2}AB)^2$. The first extensive treatment of the subject in modern times is that of Fra Luca Pacioli, whose work, *Divina proportione,* appeared in Venice in 1509; reprinted, with German translation, in the *Quellenschriften für Kunstgeschichte und Kunsttechnik des Mittelalters und der Neuzeit* (Vienna, 1889). The mediæval name, *Divine proportion,* has given place in modern times to *Sectio aurea,* or golden section. The ideas of Pacioli have recently been revived by Zeising, *Neue Lehre von den Proportionen des menschlichen Körpers* (Leipzig, 1854); id., *Der goldene Schnitt* (ib., 1884), who has claimed the golden section as the æsthetic law in nature (see Æsthetics), and by Bochenek, *Kanon aller menschlichen Gesstalten und der Tiere* (Berlin, 1885), who has applied it in matters of art. Consult also: Wittstein, *Der goldene Schnitt und die Anwendungen desselben in der Kunst* (Hanover, 1874); Pfeifer, *Der goldene Schnitt* (Augsburg, 1885); Matthias, *Die Regel von goldenen Schnitt im Kunstgewerbe* (Leipzig, 1886).



GOLDEN SPUR. A papal order, founded probably by Paul IV, but also attributed to Constantine and to Pope Sylvester II. The decoration was so freely bestowed that the value was impaired, and the order was reconstituted in 1841. It is now conferred for special distinction and for services to the Catholic church.

GOLDEN STATE. California. See States, Popular Names of.

GOLDEN TERGE, The, or The Goldyn Targe. An allegorical poem by William Dunbar, published in 1508 by Chepman and Myllar.

GOLDEN VERSES (Gk. ἔπη χρυσᾶ, *epē chrysa*). A traditional collection of gnomic sayings of the Pythagoreans, containing the teachings of virtue in practical form.

GOLDEN WARBLER. The commonest of American wood warblers (*Dendroica æstiva*), more frequently called summer warbler, yellow warbler, or summer yellowbird. (See Warbler.) The golden-winged warbler is a different but closely allied species (*Vermivora chrysoptera*), one of the swamp warblers (q.v.).

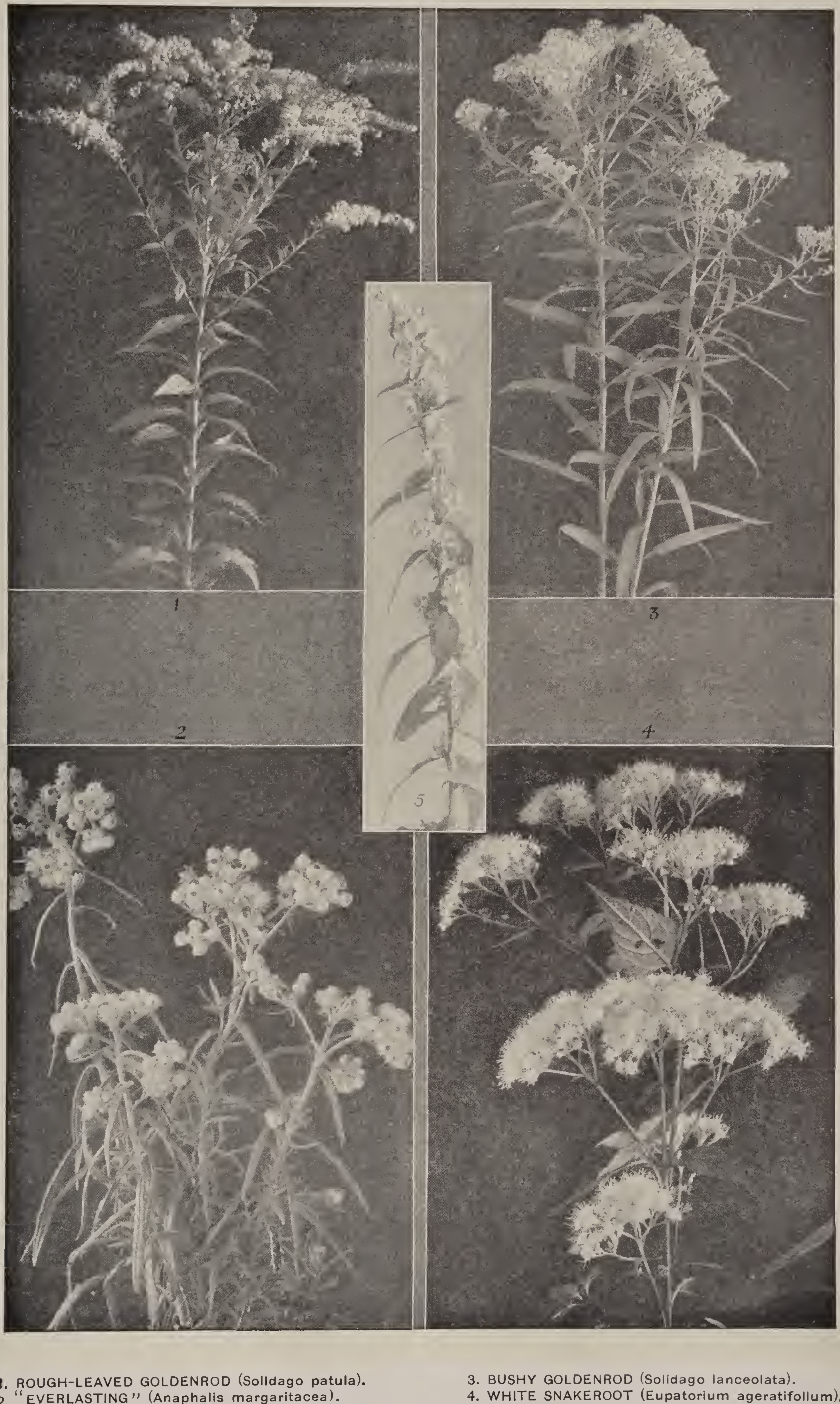
GOLDEN WEDDING. See Wedding Anniversaries.

GOLDEN-WINGED WOODPECKER. See Flicker.

GOLD'FINCH'. 1. A pretty European finch (*Carduelis carduelis*), belonging to the Fringillidæ family. It is a favorite cage bird, on account of its soft and pleasing song, its intelligence, its liveliness, and the attachment which it forms for those who feed and caress it. The goldfinch is about 5 inches in entire length; black, blood red, yellow, and white are beautifully mingled in its plumage. The colors of the female are duller than those of the male. It is widely diffused throughout Europe and some parts of Asia and is to be seen in small flocks on open grounds, feeding on the seeds of thistles and other plants or in gardens and orchards. Its nest is made in a tree, bush, or hedge, is remarkable for its extreme neatness, and is always lined with the finest downy material that can be procured. The eggs are four or five in number, bluish white, with a few spots and lines of pale purple and brown. The goldfinch is much employed by birdcatchers as a call bird. It can be trained to the performance of many little tricks, such as the raising of water for itself from a well in a bucket the size of a thimble. It has been introduced into America and is now fairly well established in the vicinity of New York City and to a less degree about Boston. See Plate of Cage Birds.

2. The American goldfinch (*Astragalinus tristis*), more generally called "yellowbird" and "thistle bird," is very similar to the European species in habits and song and displays the same interesting liveliness and affection in domestication. The nest is also of the same elegant structure. It is a common bird in most parts of North America. It is hardly 5 inches in length

GOLDENROD ETC.



1. ROUGH-LEAVED GOLDENROD (Solidago patula).
2. "EVERLASTING" (Anaphalis margaritacea).
3. BUSHY GOLDENROD (Solidago lanceolata).
4. WHITE SNAKEROOT (Eupatorium ageratifolium).
5. BLUE-STEMMED GOLDENROD (Solidago cæsia).

and is bright yellow, with the crown, wings, and tail black. The female is much duller, grayish brown, more or less tinged with yellow beneath. In winter the male assumes a plumage very similar to that of the female. The goldfinch is eminently gregarious, except during the breeding season, and it seems loath to give up its social life, for it is the last of our birds to go to housekeeping; the eggs, which are spotless, are rarely laid before the end of June. The nest is a delicate cup of soft materials, sometimes wholly of vegetable down, and is placed in a bush or low tree. It is often invaded by the cowbird (q.v.), in which case the goldfinches are likely to construct a second story—i.e., a new nest on the top of the original one—burying their own and the strange egg and laying a fresh set above. The flight of the goldfinch renders the bird easy to recognize on the wing, for it is always in a series of undulations, and generally is accompanied by a faint sweet twitter, which one writer translated as "per-chick′-o-pee." Several closely related species are found in the southwestern United States and in Mexico.

GOLDFINNY. See GOLDSINNY.

GOLD′FISH′, or GOLDEN CARP. A fish (*Carassius auratus*) closely related to the carp, a native of China, but now domesticated and naturalized in many parts of the world. It has been long common in many of the fresh waters of China and was introduced into England about the end of the seventeenth or the beginning of the eighteenth century. On account of the brilliancy of its colors and the ease with which it is kept in glass globes or other vessels in apartments, it soon became, and has continued to be, a general favorite. Its ordinary length is 5 or 6 inches, but it has been known to reach a foot. When young, it is of a blackish color, but acquires its characteristic golden red as it advances to maturity, some individuals (*silverfish*) becoming rather of a silvery hue. Monstrosities of various kinds are frequent, particularly in the fins and eyes, a favorite Japanese variety having three large tails. Culturists can induce and strengthen the artificial golden color by controlling the amount of mineral in the water. Goldfish are easily kept in small glass aquaria. There should be some sort of water plant in the water, which should not be cold, and should be changed in part every few days. Occasional sunlight is good, to prevent the growth of fungi. The safest food is that prepared and sold for the purpose. Escaped specimens naturalized in rivers (as in the Potomac) revert to their native olivaceous green hue. For an elaborate account of these fish, consult Wolf, *Goldfish Breeds* (Philadelphia, 1908). An artificial grotesque variety is illustrated on the Plate of CARP AND ALLIES.

GOLDFUSS, gōlt′fo͞os′, GEORG AUGUST (1782–1848). A German paleontologist and zoölogist. He was born at Thurnau, near Bayreuth, Bavaria, was educated at Berlin, and in 1804 received the degree of Ph.D. at Göttingen, where he became professor of zoölogy in 1818. During the last 30 years of his life he was professor of mineralogy and zoölogy at Bonn, where he was also appointed director of the Zoölogical Museum. Besides his principal work, *Petrafacta Germaniæ* (partly in collaboration with Count zu Münster, 1826–44), he published *Grundriss der Zoologie* (2d ed., 1834). He is said to have been the first to introduce the term "protozoa" into scientific nomenclature.

GOLD′IE, SIR GEORGE DASHWOOD TAUBMAN (1846–). A British administrator, the founder of Nigeria, born at the Nunnery, Isle of Man. After graduating from the Royal Military Academy at Woolwich he was lieutenant in the Royal Engineers for two years. He visited the Niger in 1877 and became interested in adding this territory to the British Empire. To this end he organized (1879) the British commercial interest of those regions into the United African Company, modeled on the defunct East India Company. The name was changed to the National African Company; its capitalization was raised from £125,000 to £1,000,000; new stations were opened; French interests were purchased; and in 1886 a charter was granted by the British government to the company under the new name of the Royal Niger Company, with Goldie as Vice Governor. In 1895 he became Governor. In spite of the activities of French and German political agents, Goldie built up the state and maintained the integrity of the territory, but finally, in 1900, the Royal Niger Company sold its territory to the British government for £865,000. Goldie was a royal commissioner on the South African War in 1902–03 and on war stores in 1905–06. He was created a K. C. M. G. in 1887, was chosen president of the Royal Geographical Society in 1905, and became a fellow of the Royal Society, a privy councilor (1898), and an alderman of the London County Council (1908).

GOLD′ING, ARTHUR (c.1556–c.1605). An English writer and translator. He was born probably in London and is said to have studied at Queen's College, Oxford. He was a friend of Sir Philip Sidney, who, on leaving for the Low Countries, intrusted to him the completion of the translation of Philippe de Mornay's treatise, *De la vérité de la religion chrétienne,* which Golding published under the title *A Woorke Concerning the Trewenesse of the Christian Religion* (1589). He made many translations, devoting himself especially to those from the works of Calvin and Theodore Beza, but will be remembered chiefly for his rendering into English, in ballad metre, of the "fyrst fower bookes" of Ovid's *Metamorphoses* (1565–67).

GOLD LACE. A fabric formed by weaving silken threads that have been previously gilded. The peculiarity of this manufacture consists in the gilding of the silk in such a manner that it shall retain sufficient flexibility for weaving. A deep yellow or orange-colored silk is used for the purpose. The usual method of doing this is by what is called "fibre plating." A rod of silver is gilded by simply pressing and burnishing leaves of gold upon it. This gilded silver is then drawn into very fine wire, so fine that one ounce of metal can be extended to the length of more than a mile. It is then flattened between polished steel rollers, and further extended, so that a mile and a quarter weighs only one ounce; for the last drawing the wire is passed through perforated gems, such as diamonds or rubies. The film of gold upon this flattened wire is much thinner than beaten gold leaf and has frequently been quoted as an example of the divisibility of matter, as one inch of the highly gilded wire contains but the eighty-millionth part of an ounce of gold, while $\frac{1}{100}$ of an inch, which is a visible quantity exhibiting the color and lustre of gold, contains but $\frac{1}{800000000}$ of an ounce; or, in other words, one ounce of gold covers a length of wire of more than 100 miles. This flattened gilded wire is then wound over the silk, so as to inclose it completely and produce an apparently golden thread. Other means of directly gilding the thread have been tried and for some purposes are successful; but none have yet been discovered which give the thread the same degree of lustre as the above, which was first practiced in a ruder manner by the Hindus. Much of the so-called gold lace of commerce is made of an alloy known as Dutch metal. Silver Lace is made in the same manner as gold lace, except that the gold coating is omitted. Both gold and silver lace are used extensively for military and other uniforms and for ornamental effects in women's apparel.

GOLD LEAF. See Goldbeating.

GOLDMAN, gōlt′män, Emma (1869–). An American anarchist, born in Kovno Province, Russia. She lived in Königsberg, Prussia, in 1878–82, went to St. Petersburg, and in 1886 emigrated to the United States. The execution of certain participants in the Haymarket Square Riot (q.v.) in Chicago in that year aroused her sympathies and finally led her to support anarchism. After 1889 she was associated in New York with Johann G. Most, Alexander Berkman, and other agitators, among whom her fiery speeches in German and Yiddish soon made her popular. In 1893 she was sentenced to one year at Blackwell's Island (New York) for inciting to riot. She lectured in England and Scotland in 1895 and 1899 and made extended lecture tours in the United States in 1897, 1899, and 1907–10. Following the assassination of William McKinley in 1901, she lived under the name of "Miss Smith" to escape persecution. After 1906 she coöperated in the publication of *Mother Earth,* a monthly anarchist magazine. She had attended the First Anarchist Congress at Paris, in 1899, and in 1907 was a delegate to the Second Congress at Amsterdam. Her writings include *Anarchism and Other Essays,* with a biographical sketch by Hippolyte Havel (1910), and *The Social Significance of the Modern Drama* (1914).

GOLDMARK, gōlt′märk′, Karl (1830–1915). An Austrian composer. He was born in Keszthely, Hungary, and musically was largely self-taught, although he had some instruction on the violin from Jansa in Vienna in 1844 and three years later took lessons in composition from Böhm. Firmly believing in his musical talent, he devoted himself almost entirely to composition. Overcoming the most difficult obstacles, he so far succeeded as to give his first public concert in Vienna at the age of 26 years, a pianoforte concerto of his own being a feature of the programme. Outside of Germany he is better known through his orchestral suites and arrangements and small instrumental and vocal compositions than for his operas, although in his own country, as well as in Germany, they are regarded as standard. His published works include: operas—*Die Königin von Saba,* his chief operatic success; *Merlin* (1886); *Das Heimchen am Herd* (1896, from Dickens's *Cricket on the Hearth*); *Die Kriegsgefangene* (1899); *Götz von Berlichingen* (1902); *A Winter's Tale* (1906). The overtures to *Prometheus Bound, Sappho, Sakuntala, Penthesilea, Im Frühling,* and *In Italien* are universal favorites. Other compositions are: *Sturm und Drang* (for pianoforte, op. 5); symphonies—*Ländliche Hochzeit,* and one in E flat; scherzo in A (for orchestra); a symphonic poem *Zriny;* two violin concertos; chamber music; songs; choruses.

GOLDMARK, Rubin (1872–). An American composer, born in New York. From 1889 to 1891 he studied piano and composition at the Vienna Conservatory, and after his return to America continued the piano with Joseffy and composition with Dvořák. For six years he was director of the Colorado College of Music (1895–1901). In 1902 he returned to New York, devoting his time to composition and lecture recitals. His compositions include *Theme and Variations,* for orchestra, a concert overture *Hiawatha,* a symphonic poem *Samson;* some excellent chamber music, piano pieces, and songs.

GOLD OF PLEASURE, or False Flax (*Camelina*). A genus of plants of the family Cruciferæ. The common gold of pleasure (*Camelina sativa*) (Fr. *Cameline,* Ger. *Dotter*) is an annual 1½ to 3 feet high, with smooth, bright-green, entire or slightly toothed leaves, and terminal racemes of yellow flowers and pear-shaped pods. Notwithstanding its high-sounding English name, the plant is of humble and homely appearance. It grows in fields and waste places of Europe and the north of Asia, but is not regarded as a native of America, although often found in fields, particularly of flax. Its seed is very commonly mixed with flaxseed imported from other lands. In many parts of Germany, Belgium, and the south of Europe it is extensively cultivated for the sake of its seeds, which are rich in oil, and the oil cake of which, as well as the seeds, though inferior to linseed and linseed-oil cake, is also used for feeding cattle. The oil, although sweet and pure at first, soon becomes rancid and is less valued than that of rapeseed or colza, with which it is often mixed. The value of the plant in agriculture depends much on its adaptation to poor sandy soils, although it prefers those of a better quality; and, on account of its rapid growth, to secondary cropping and green manuring. Since it readily scatters seed, it is likely to become a weed pest. The stems, which are tough, fibrous, and durable, are used for thatching and making brooms; their fibre is adapted for making coarse paper. See Camelina.

GOLDONI, gŏl-dō′nē, Carlo (1707–93). The most celebrated Italian writer of comedy. He was born in Venice, Feb. 25, 1707, of a good family, which lost its property in his childhood. His father, a physician, took him to Perugia, where he first entered school. He was encouraged by his father in his strong taste for the literature of classic comedy and was given an opportunity for practice on the amateur stage. But the boy showed no aptitude for such performances and was sent to Pavia to study for the Church. Still less fitted, however, for being an ecclesiastic than for being an actor, he was finally expelled from college for writing scurrilous satires. He studied law and was admitted as an advocate, getting his degree from Padua in 1732, after his father's death. But the legal profession did not prove lucrative, and he relinquished its practice to set about composing comic almanacs, which became highly popular. In this early part of his career he wrote a few tragedies, among them *Belisario,* and several of his minor comedies were represented, attracting public favor by their novelty as well as their merits. In 1736 he married the daughter of a notary of Genoa, and about 1740 was for a short time Consul of Genoa at Venice.

Financial difficulties, however, occasionally hampered him in literary work, until, having obtained an introduction to Prince Lobkowitz, he was intrusted with the composition of an ode in honor of Maria Theresa, and with the organization of the theatrical entertainments of the Austrian army. Subsequently for a time he lived at Florence and Pisa. He returned to Venice in 1747 to write for a manager named Medebac, and five years later he made still more lucrative arrangements at the theatre of St. Luke, where much of his best work was done. In 1761 he was invited to France, where he was soon appointed Italian master to the royal children—a situation which allowed him to devote himself tranquilly to his literary occupations. He began after a time to write in French, and *Le bourru bienfaisant*, composed for the wedding of Louis XVI, excited the admiration even of Voltaire. On the breaking out of the Revolution Goldoni lost his pension, but after his death (Feb. 6, 1793) it was restored to his widow. He left about 150 comedies of very unequal merit, some of the most noted of which are: *La donna di garbo; La bottega del caffè; Pamela nubile; I Rusteghi; Todero Brontalon; La casa nova; La locandiera; Il giocatore; Il vecchio bizzarro;* and *L' Adulatore.* His ambition was to dispense with some of the conventional accessories of the comic stage of his time and elevate that branch of the national drama from the buffooneries into which it had fallen. In this he succeeded. He was a great admirer of Molière, and the larger part of his works are inimitable representations of the events of daily life, under both their simplest and their most complex aspects.

Consult: the *Memoirs of Carlo Goldoni*, trans. by John Black, with an essay by Howells (Boston, 1877); Gherardini, *Vita di Carlo Goldoni*, prefixed to the collected comedies (Milan, 1821); Molmenti, *Carlo Goldoni* (Venice, 1875); Galanti, *Goldoni e Venezia, nel secolo XVIII* (Padua, 1883); Rabany, *Carlo Goldoni: Le théâtre et la vie en Italie au XVIIIème siècle* (Paris, 1896); Copping, *Alfieri and Goldoni: Their Lives and Adventures* (London, 1857); *Lettere di Carlo Goldoni, con prefazione e note di G. M. Urbani* (Venice, 1880); Dole, "Goldoni and Italian Comedy," in *The Teacher of Dante* (New York, 1908); Mathar, *Carlo Goldoni auf dem deutschen Theater des XVIII Jahrhunderts* (Montjoie, 1910); Chatfield-Taylor, *Goldoni: A Biography* (New York, 1913). The most complete edition of his plays is that of Venice, 1788, republished in Florence in 1827.

GOLDS, gōldz. A people living on the Lower Amur, in southeastern Siberia, belonging physically and linguistically to the Tungusic group of Siberian peoples. Deniker (1900) describes them as "of a very pure type, and having a fairly well developed ornamental art." Laufer, who visited them in 1898–99, notes the great influence of Chinese symbolism and ornamental *motifs* upon the art products of the Golds; the dragon and the cock seem to have been introduced thus. The Golds have a rich mythology (with many archaic words and phrases), a considerable portion of which has evidently originated in Mongolian Central Asia. From the Chinese some of the Golds have learned the art of silk embroidery, in which they display great skill. Although fishers and hunters generally, a portion of them have taken to agriculture with not a little success. They are said to be losing of late years their individuality through the mania for Russian fashions, etc. Laufer informs us that "a tendency to rationalism, due perhaps to continuous contact with Chinese culture, is one of the distinguishing traits of the Gold's character." It is to this "preponderance of intellect" that Laufer attributes the absence of many ceremonies, feasts, etc., among the Golds, and the dying out of belief in the old shamans, whose place the Russian physician now takes. Marriages of Golds and Chinese are said to be often infertile. A primitive people, under the influence of such differing cultures as the Chinese and the Russian, the Golds are of considerable ethnological importance. The best recent account of the Golds and other tribes of the Amur will be found in Schrenck, "Die Völker des Amurlandes," vol. iii of his *Forschungen in Amurland, 1854–56* (St. Petersburg, 1881–91), and Laufer, "The Amoor Tribes," in the *American Anthropologist* (New York) for 1900.

GOLDS'BORO. A city and the county seat of Wayne Co., N. C., 50 miles by rail southeast of Raleigh, on the Southern, the Atlantic Coast Line, and the Norfolk Southern systems, and on the Neuse River (Map: North Carolina, E 2). It has Hermann Park, an Odd Fellows' Orphan Home, the Eastern Insane Asylum (colored), the Goldsboro Hospital, and the Spicer Sanitarium. The city is the commercial centre for an agricultural and cotton-growing region. Its industrial plants include cotton, oil, lumber, and rice mills, furniture factories, agricultural-implement works, veneer plants, brickworks, a tobacco stemmery, knitting mills, machine shops, and tobacco warehouses. Goldsboro was settled in 1838 and was incorporated three years later. Under a charter of 1901 the government is vested in a mayor, elected every two years, and a council. The water works are owned and operated by the municipality. Pop., 1900, 5877; 1910, 6107; 1914 (U. S. est.), 10,500.

GOLDS'BOROUGH, LOUIS MALESHERBES (1805–77). An American naval officer, born in Washington, D. C. He was appointed a midshipman in the navy in 1812, when only seven years old, but did not enter upon active duty until 1816. He served on the Mediterranean and Pacific stations and was promoted a lieutenant in 1825. He then spent two years in study in Paris on leave of absence. In the following year (1827), being again on duty in the Mediterranean, he distinguished himself by rescuing an English brig which had been captured by pirates in the Grecian archipelago. In 1833 he retired from the navy and settled in Florida, where he recruited and commanded a company of volunteer cavalry during the Seminole War. Returning again to the navy, he was promoted commander in 1841 and served in the Mexican War, acting as executive officer of the frigate *Ohio* at the bombardment of Vera Cruz. In 1849 he was a member of the joint army and navy commission in California and Oregon; was superintendent of the United States Naval Academy at Annapolis from 1853 to 1857, during which period (1855) he attained the grade of captain; and from 1857 to 1861 was again at sea. He was made flag officer at the outbreak of the Civil War, and on the abolition of that rank in 1862 became rear admiral. His first service was with the North Atlantic blockading squadron in September, 1861. He commanded the fleet which coöperated with General Burnside in his North Carolina expedition in 1862, commanded the European squadron in 1865–67, and subsequently was commandant of the navy yards at Mare Island, California, and at Washington. In 1873 he retired from active duty as senior officer in point of length of service.

GOLDSCHMID, gōlt′shmĭt. See Fabricius, Georg.

GOLDSCHMIDT, gōlt′shmĭt, Adalbert von (1848–1906). A German composer. He was born at Vienna and was educated at the conservatory in that city. Although not a musician by profession, he acquired an excellent reputation as a composer, notably through his three-part cantata *Die sieben Todsünden,* based upon the celebrated poem by Robert Hamerling. The cantata was first performed at Berlin in 1875. In 1884 Goldschmidt brought out an opera entitled *Helianthus,* which was followed, in 1889, by a trilogy, *Gæa.*

GOLDSCHMIDT, Hans (1861–). A German industrial chemist. He was born in Berlin; was educated in the sciences at Berlin, Strassburg, Heidelberg, and Charlottenburg; and then spent several years in travel. In 1886 he entered into partnership in the chemical manufactory established by his father, and together with his brother Karl he built up an important industry. He is chiefly known, however, for the "Goldschmidt process." See Alumino-Thermics.

GOLDSCHMIDT, Jenny Lind. See Lind, Jenny.

GOLDSCHMIDT, Meïr Aaron (1819–87). A Danish publicist and novelist, born at Vordingborg, of Jewish parents. He began journalistic work at an early age with the *Næstved Ugeblad,* which became later the much-feared *Corsaren* (1840–46). In 1847 he founded the periodical *Nord og Syd,* which under his management became an influential political organ. In 1861 he established the weekly paper *Hjemme og Ude.* He was a gifted story-teller, and his descriptions of Jewish life have never been surpassed. His numerous novels, tales, and dramas include: *En Jöde* (1845; 3d ed., 1899; Eng. trans. under the title *The Jew of Denmark,* by Mrs. Bushby, 1852); *Hjemlös* (5 vols., 1853–57; Eng. trans. by the author under the title *Homeless; or, A Poet's Inner Life,* 1861); *Rabbien og Ridderen* (1869), a drama; *Kjärlighedshistorier fra mange Lande,* a series of love tales of various lands (1867); *Avromehe Nattergal* (1873). In *Ravnen* (1867; 3d ed., 1899) and *Maser* he is at his best. A selected edition of his works was published in 1898 et seq. His autobiography, *Livserindringer,* appeared in 1877 in two volumes. Consult G. Brandes, *Levned* (1908).

GOLDSCHMIDT, Otto (1829–1907). A German-English pianist, conductor, and composer. He was born at Hamburg and was a pupil of Jakob Schmitt, Mendelssohn, and Chopin. In 1851 he accompanied Jenny Lind on her American tour and married her at Boston in the following year. After a sojourn of three years at Dresden (1852–55), the couple removed to London in 1858, after which Goldschmidt was prominently identified with the musical life of the British capital. He successively became professor and vice principal of the Royal Academy of Music (1863), and director of the Bach Choir (1876–86), a society founded by him in 1875. He also on several occasions conducted the celebrated Lower Rhine Festivals at Düsseldorf. Among his principal musical publications are: *Ruth,* an oratorio (1867); *Choral-Book for England* (with Julius Benedict); a pianoforte concerto, op. 10; a pianoforte trio, op. 12; and several other pianoforte compositions and songs.

GOLDSCHMIDT PROCESS. See Alumino-Thermics.

GOLD SEED. See Dog's-Tail Grass.

GOLD′SINNY, or **GOLD′FINNY.** A small, bright-yellow European wrasse (*Symphodus melops*), frequenting rocky coasts and sometimes taken by anglers.

GOLD′SMID, Sir Frederick John (1818–1908). A British soldier, explorer, and Orientalist. He was educated at King's College, London, in 1839, entered the army of the East India Company, and served in the China War in 1840–41 and in the Crimea with the Turkish army in 1855–56. He retired in 1875 with the rank of major general. Goldsmid became known more especially for his services in establishing the Indo-European telegraph, of which he was director general from 1865 to 1870. Having obtained telegraph treaties, he superintended the construction of the lines across Persia and Baluchistan to India. In 1870–72 he adjusted boundary claims between Persia and Baluchistan and between Persia and Afghanistan. He was controller of the crownlands of Daira Sanieh in Egypt in 1881–82, conducted a diplomatic mission for the British government to Constantinople in 1882, and in 1883 was administrator in the Congo for King Leopold II of Belgium. Versed in Hindustani, Persian, Arabic, and Turkish, Goldsmid was considered an authority on Oriental questions. He published *Telegraph and Travel* (1874), *Eastern Persia* (2 vols., 1876), and the *Life of Sir James Outram* (2 vols., 1880; 2d ed., 1881).

GOLDSMID, Sir Isaac Lyon (1778–1859). An English Jewish financier and philanthropist, born in London. He was bullion broker of the Bank of England and of the East India Company. University College, London, owes much to him; from 1839 to 1857 he was treasurer of the University College or North London Hospital, which he helped to found in 1834. He was zealous in the cause of Jewish emancipation—the ultimate passage of the Jewish Disabilities Bill, first introduced in 1830, was greatly due to his energy. In 1841 he was created Baronet, the first Jew to win that distinction in England. For settling the monetary dispute between Portugal and Brazil the Portuguese government made him Baron da Palmeira in 1846.

GOLD′SMITH, Lewis (c.1763–1846). An English journalist, whose parents or grandparents were Jews from Portugal. He was born in London and was educated there for the law. A strong sympathizer with the Revolutionists in France and Poland, he published, in 1801, *The Crimes of Cabinets, or a Review of the Plans and Aggressions for the Annihilation of the Liberties of France and the Dismemberment of her Territories,* and the following year removed to Paris, where, with the assistance of Talleyrand, he established a triweekly paper, the *Argus,* in the interests of Napoleon. But Napoleon having demanded of him services of espionage and intrigue that he refused to render, he returned to London in 1809 and two years later founded the *Anti-Gallican Monitor,* in which he vehemently pleaded for drastic measures to effect Napoleon's overthrow. He also published: *A Secret History of the Cabinet of Bonaparte* (1810); *Secret History of Bonaparte's Diplomacy* (1812); and *An Exposition of the Con-*

duct of France towards America (1810). He became a disciple of Robert Owen, again removed to Paris in 1825, and died there Jan. 6, 1846. In 1832 he published *Statistics of France.*

GOLDSMITH, Oliver (1728–74). An Irish author. He was born, according to long-accepted belief, at Pallas, County Longford, Ireland, or, as now seems more probable, at Elphin, County Roscommon, Nov. 10, 1728. His father, Rev. Charles Goldsmith, was a clergyman of the Established church. When six years old, Oliver was placed in the village school kept by an old soldier, Thomas Byrne, described in "The Deserted Village." On leaving Byrne's school, he suffered permanent disfigurement from a bad attack of smallpox. He subsequently attended other small schools and at length entered Trinity College, Dublin, as a "sizar," or poor scholar (June 11, 1744). Neither at school nor at the university did he display any conspicuous talents. But he had long been interested in chapbooks and the ballads of the peasantry and had attempted verse. Disliking his tutor and his studies, humiliated by his position, and becoming involved in trouble over a convivial entertainment in his college rooms, at which, contrary to rules, persons of both sexes were present, he sold his books and ran away to Cork. Through the influence of his brother Henry he was induced to return to the university, where he was graduated B.A. (Feb. 27, 1749). His uncle, the Rev. Thomas Contarine, who had helped Goldsmith at the university, now tried to induce him to take orders. He became a candidate for the ministry, but was rejected, on what grounds history does not record, by the Bishop of Elphin. Thereupon he went to Cork to embark for America, but missed his ship. His uncle next gave him £50 to study law in London; but Goldsmith soon returned, having got no farther than Dublin, where he lost his money at a gaming house. Again aided by Mr. Contarine, he succeeded in reaching Edinburgh, where he began the study of medicine in 1752; but towards the end of the next year he sailed for Leyden and then set out on the grand tour, wandering on foot through Flanders, France, Germany, and Italy, paying while in France for the hospitality of the peasants by playing on his flute. In 1756 he returned to England with empty pockets and soon began to practice medicine in Southwark. He quickly abandoned his profession to become, in turn, proof reader, usher in an academy at Peckham, and then hack writer at "an adequate salary" for the *Monthly Review.* In 1758 he was nominated physician and surgeon in the India service, but the appointment was not confirmed; and being examined the same year at Surgeons' Hall for the post of "hospital mate," he was found "not qualified." The very clothes in which he appeared before his examiners were borrowed; and, being in great distress, he pawned them.

Besides several articles in the *Monthly Review,* Goldsmith had by this time translated the *Memoirs of Jean Marteilhe of Bergerac* (1758). In April of the next year he attracted some attention by the *Enquiry into the Present State of Polite Learning in Europe.* He was employed on three periodicals started in this year, writing probably all the articles for the *Bee,* a weekly that ran through only eight numbers. On Jan. 24, 1760, he contributed to the *Public Ledger* the first of the celebrated letters of a Chinese, which were collected and published in book form two years later under the title of *The Citizen of the World.* In 1762 appeared also the *Life of Richard Nash,* the famous Bath beau. His literary work had already gained him the friendship of Bishop Percy and Dr. Johnson. In 1764 the Literary Club was founded, and Goldsmith was one of the nine original members. He was thus brought into intimacy with some of the most eminent men of the time. This year he published *A History of England,* in a series of letters, which was followed by "The Traveler" in 1764, a poem which placed him at once in the front rank of contemporary poets. In 1766 came his only novel, *The Vicar of Wakefield,* which, with all its faults, is one of the most delightful stories in English literature. It has passed through more than 100 editions. Turning now to the drama, he produced *The Good-Natured Man,* performed at Covent Garden, Jan. 29, 1768. It did not meet with great favor. Disheartened, he turned again to hack work; but in 1770 he published his finest poem, "The Deserted Village." On March 15, 1773, *She Stoops to Conquer,* unsurpassed among later English comedies, was performed at Covent Garden, and met with instant success. Goldsmith died in his chambers at the Middle Temple, April 4, 1774, and was buried in the grounds of the Temple Church. The Literary Club erected a monument to his memory in Westminster Abbey, bearing an epitaph by Dr. Johnson. His statue stands at the portal of Trinity College, Dublin. While Goldsmith was producing his finest work, he was also compiling histories and writing reviews. Among productions not mentioned above are: *The History of Greece* (1774); the incomplete *History of Animated Nature* (1774); and the delightful poems, "Retaliation" (1774) and "The Haunch of Venison" (1776). Goldsmith did not possess Johnson's massive intellect, nor Burke's passion and general force; but he wrote the finest poem, the most charming novel, and—with the exception perhaps of *The School for Scandal*—the best comedy of the period. Than his style, nothing could be more natural, simple, and graceful. For his life, consult the memoir from Bishop Percy's materials in *Miscellaneous Works* (London, 1831); Forster (ib., 1848; enlarged ed., 1854); Irving (New York, 1849); Black, in *English Men of Letters* (London, 1879); Dobson, in *Great Writers* (ib., 1888); the critical biography by H. S. Krans in the first volume of the Turk's Head edition (10 vols., New York, 1908), which emphasizes the Irish aspects of Goldsmith's work; Moore, *Life of Oliver Goldsmith* (London, 1910); also Boswell, *Life of Dr. Johnson* (ib., 1889), and the Wakefield edition of the *Complete Works* (12 vols., ib., 1900). J. J. Kelly's *Early Haunts of Oliver Goldsmith* (Dublin, 1905) contains original material concerning the topic indicated by the title of this book, and also strong arguments in favor of Elphin as Goldsmith's birthplace.

GOLDSMITH, Oliver (?1787–c.1848). A Canadian writer. He was born in Annapolis County, Nova Scotia, and was educated in the public schools, entered the commissarial department as a clerk, and eventually attained the rank of commissary general. He collected material for, but never published, a biographical work on the distinguished men of Nova Scotia. His poem, *The Rising Village* (1825), was highly praised. It commemorates the busy life of a new settlement and is a sentimental contrast to *The Deserted Village* of the distinguished relative for whom he was named. See Canadian Literature.

GOLDSMITH BEETLE. A large scarabæid beetle (*Cotalpa lanigera*) of the eastern United States, allied to the dung beetles, and golden yellow in color. The specific name *lanigera*, or wool bearer, refers to the dense hairy coat which covers the underside of the body. It is especially fond of willow trees, where it hides and nests among the leaves in the daytime, going abroad only at night. It deposits its large eggs singly in the soil, and the larval stages, which extend over about three years, are passed underground. The name is applied in a more general way to all the beetles of the group Rutelinæ, of which many of the largest and most brilliantly metallic inhabit Central America.

Goldsmith Beetle.
(*Cotalpa lanigera.*)

GOLDSMITH MAID. A bay trotting mare, sired by Abdallah, and famous between 1866 and 1878. In 1871 she took the mile trotting record from Dexter in 2:17; but in 1874 was beaten by Rarus (2:13¼).

GOLDSMITH'S WORK. See Jewelry; Plate.

GOLD STICK. An officer in the English Royal Bodyguard, and a captain in the Corps of Gentlemen-at-Arms. They are so called because, on state occasions, they carry a gilded baton. See Gentlemen-at-Arms.

GOLDSTÜCKER, gōlt′shtu̇k-ēr, Theodor (1821–72). A German-English Sanskrit scholar. He was born of Jewish parents at Königsberg, Prussia, and was educated in that city and in Bonn and Paris, where he studied under Burnouf. After a visit to England and a sojourn of two years at Königsberg, he went to Berlin, where he contributed valuable material on Indian affairs to Humboldt's *Kosmos.* Expelled from Berlin because of his political opinions in 1848, he accepted Wilson's invitation to come to England and in 1852 was appointed professor of Sanskrit at University College, London. During an activity of nearly 30 years at that institution he did much towards the advancement of Oriental science. He was an able controversialist, but frequently permitted himself to be carried too far in his attacks on such distinguished scholars of the German school as Böhtlingk, Weber, and others. He began an extensive revision of Wilson's *Sanskrit and English Dictionary* in 1856, but was obliged to interrupt this colossal undertaking before reaching the end of the letter A (480 pp., London, 1856–64). His writings include: *On the Deficiencies in the Present Administration of Hindu Law* (1871); *Pânini: His Place in Sanskrit Literature* (1861); an anonymous translation of Krishna Miśra's *Prabōdha-Chandrōdaya* (Königsberg, 1842); and his posthumous edition of the *Mahābhāshya* (3 vols., London, 1874), which also contains a biographical note (vol. i, pp. 5–16). Many of his minor contributions are collected in his *Literary Remains* (2 vols., London, 1879).

GOLD THREAD. See Coptis.

GOLD′TIT, or Verdin. A most curious little bird (*Auriparus flaviceps*) of the titmouse family (Paridæ). It is 4 inches long, and abundant in the valleys of the Rio Grande and Colorado and in Lower California. The upper parts are ashy, the under parts whitish, and the whole head golden yellow. Its habits and manner partake of those of both the chickadees and the warblers; and it makes a remarkable nest, often as large as a man's head, woven of twigs into a globular mass, and placed in a thorny tree. It is lined with down and feathers, and the eggs are four to six, pale bluish speckled with brown. Consult Coues, *Birds of the Colorado Valley* (Washington, 1878).

GOLD WASP. See Cuckoo Fly.

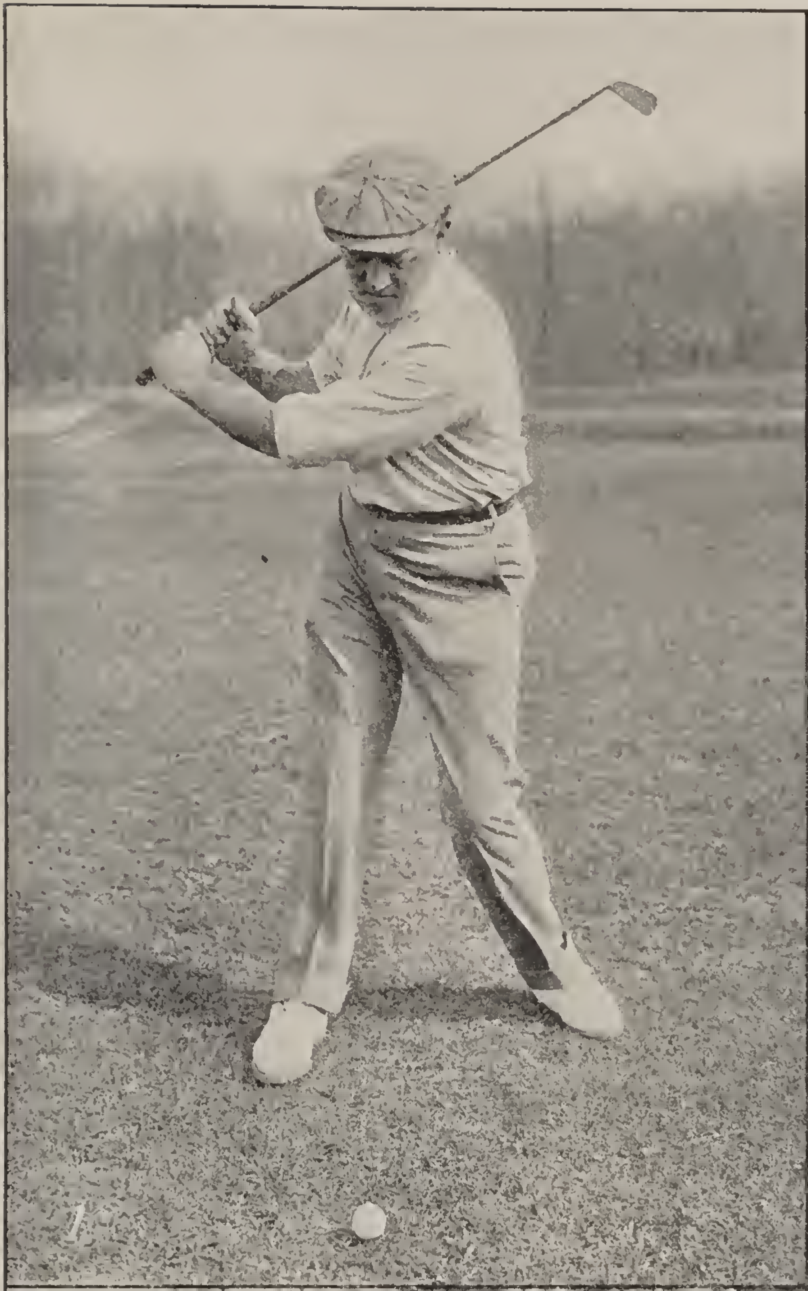
GOLDZIHER, gōlt′tsē-ēr, Ignaz (1850–). An Hungarian Orientalist, born at Stuhlweissenburg. He studied at the universities of Budapest, Berlin, and Leipzig, and made special investigation of Oriental manuscripts in the libraries of Leyden and Vienna. He was appointed a lecturer at the University of Budapest in 1872 and became professor there in 1894. In 1876 he was elected a corresponding member, and in 1892 a full member, of the Hungarian Academy. He visited Egypt, Syria, and Palestine in 1873–74. His writings in Hungarian comprise a large number of contributions to the publications of the Academy, including papers on Oriental bookmaking (1874), on the history of philological study among the Arabs (1878), and on the progress and results of archæology in Palestine (1886). His chief publications are in German, among them such scholarly works as *Studien über Tanchûm Jerûschalmi* (1871); the treatise *Der Mythos bei den Hebräern und seine geschichtliche Entwicklung* (1876; Eng. trans., 1877); *Mohammedanische Studien* (2 vols., 1889–90); *Abhandlungen zur arabischen Philologie* (2 vols., 1896–99); *Vorlesungen über den Islam* (1910; Hung. trans., 1912; Fr. trans. by Arin, 1914). Goldziher is considered one of the foremost European scholars in subjects connected with Mohammedanism.

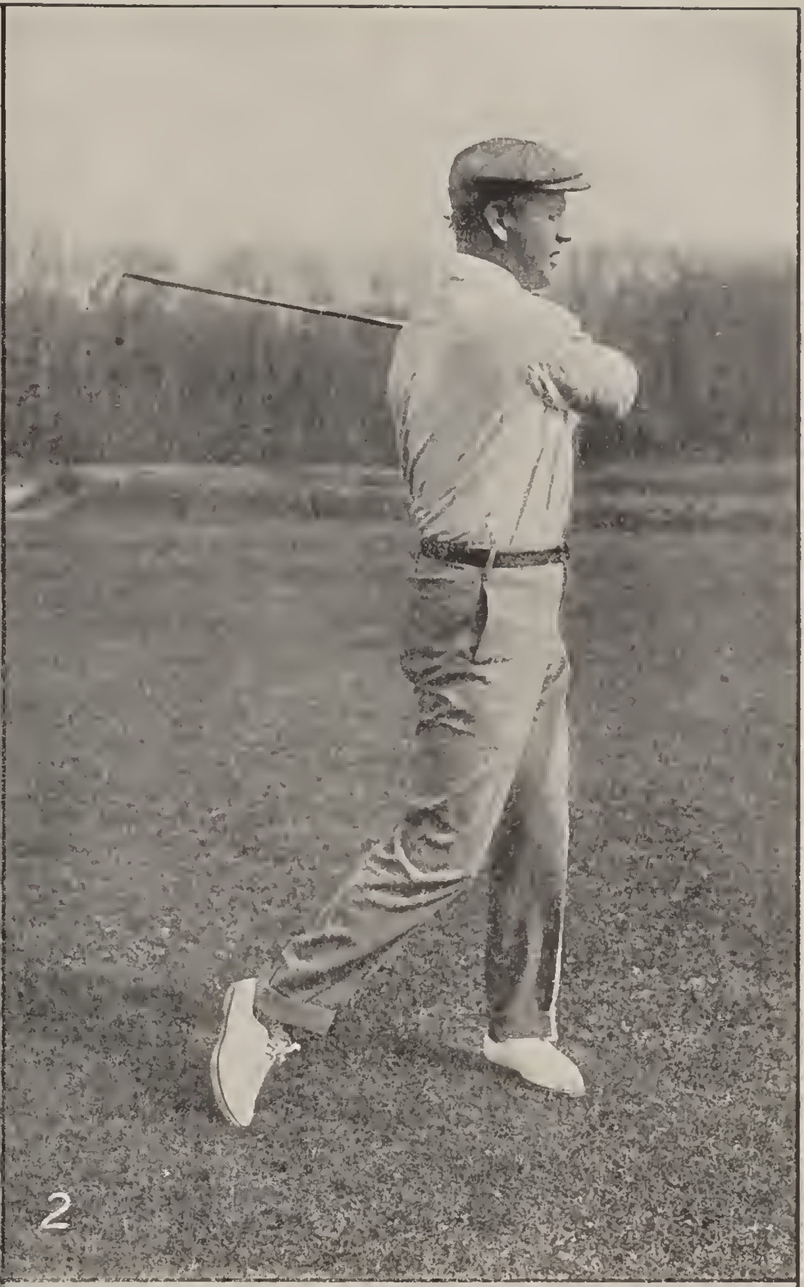
GO′LER, George W. (1864–). An American health officer. He was born in Brooklyn, N. Y., and graduated from the medical department of the University of Buffalo in 1889. Between 1888 and 1897 he served at the Infants' Hospital at Charlotte, N. Y.; was medical inspector of the Rochester (N. Y.) Board of Health in 1892–96, and health officer after 1896. In 1897 he established in Rochester municipal milk depots that have served as models for health officers throughout the United States and Europe. In addition, Dr. Goler instituted a vigorous and sustained campaign against unsanitary conditions in the dairy farms forming the source of the city's milk supply. In 1904 he became attending physician of the Rochester Hospital for Infectious Diseases, which he had been instrumental in founding. He served at one time as president of the Hospital Medical Society and is author of papers on the problems of milk supply and on tuberculosis.

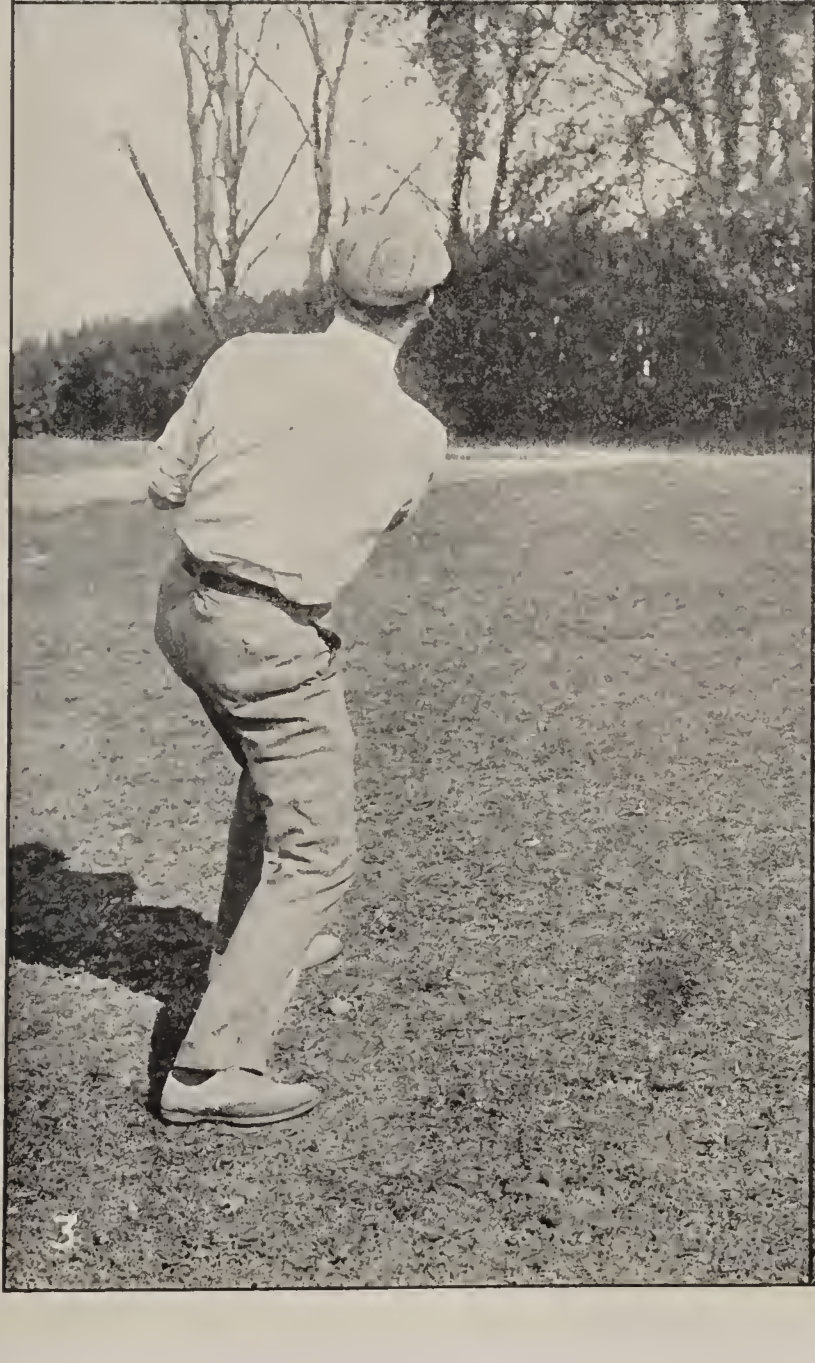
GOLET′TA. The port of Tunis, Africa.

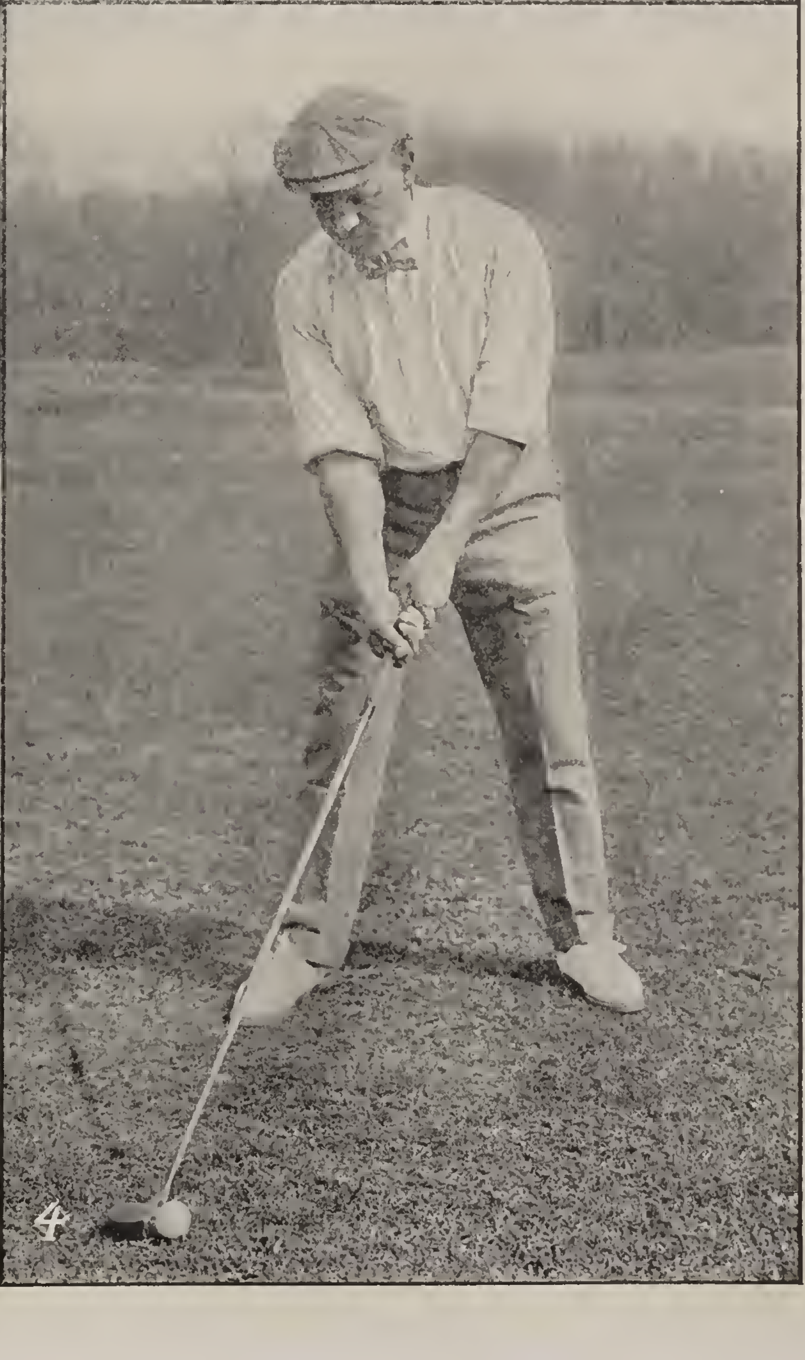
GOLF (perhaps from Dutch *kolf*, OHG. *cholbo*, Ger. *Kolbe, Kolben*, club, Icel. *kolfr*, bolt, *kylfa*, club). Par excellence, the national game of Scotland, though possibly of Dutch origin. The Romans had a game called *paganica*, played with a crooked stick and a ball of leather stuffed with feathers, and in England, during the reign of

GOLF









1. TOP OF THE SWING
2. FINISH
3. HALF MASHIE SHOT
4. ADDRESSING THE BALL

Edward III, the game was called *bandy ball*, or *cambuca*. The Dutch game differs greatly from the Scottish, and it is maintained that golf is a lineal descendant of the game of *shinty*, but it is more probable that it is a combination of both. Shinty is a rude game of force; golf, a game of skill.

In 1457 golf was so much played in Scotland that it took the place of archery and other ancient games. The year following, Parliament passed an act that the game be abandoned, and it was not until 1491 that Parliament ceased to interfere with it.

In 1592 the Town Council of Edinburgh ordained that none of the inhabitants "be sene at ony pastymes or gammis within or without the town upoun the Sabboth-day sic as Golf, Archerie, etc." Even during the seventeenth century similar acts were passed, and offenders were severely punished. This extract from the Kirk-Session Books of the Parish of Cullen, Banffshire, is an excellent example: 1641. "James and George Duffus and Charles Stevinson convict in break of ye Sabboth for playing at ye golff efternovne in time of sermone and yrfor are ordayned evrie ane of them to pay halff a merk and mak yr repentance ye next Sabboth." When James VI of Scotland succeeded Queen Elizabeth on the English throne, his Scottish train played the game on Blackheath; whereby came about the curious fact that the oldest organized golf club is English. It was an exotic, however, and remained the only one south of the Tweed for 250 years. James VI secured a special "club-maker to his Hienes" and therefore established a monopoly of ball making to prevent gold and silver from going out of his kingdom for buying golf balls. The Duke of York (afterward James II) was very fond of the game, and one day, with an Edinburgh shoemaker as his partner, he defended Scotland's claims in the sport against two English noblemen. The Duke and his partner completely outplayed their opponents in the foursome. This was the first great match of which we have record. Meanwhile in Scotland the game maintained its popularity and was so generally indulged in by all classes of society that any village in East Lothian could be sure of competitors, from the village cobbler to the laird of the neighborhood. The early conditions were as democratic as the company.

Henceforward the history of golf is marked mainly by the formation of societies and clubs for the practice and promotion of the game. Some of the most celebrated of these institutions were the Honourable Edinburgh Company of Golfers, the Edinburgh Burgess Golfing Society, and the Royal and Ancient Golf Club of St. Andrews, established in 1754, now the national club of Scotland.

A tent erected upon special occasions was the only rendezvous of the local golfers; and the links were laid out across a tract of common land by the seaside, over which every inhabitant of the district had some right. The prize was seldom more than a club with a silver band round it, or a dozen balls, or later on a simple medal; even the great national prize was only a silver club, and that never became the property of the winner. The association for which the winner played had its custody until the next yearly contest. The earliest implements with which the game was played were practically as good as they are to-day, except in the case of the balls, which were formerly simply a leather case stuffed with feathers. The two great Scottish associations, while younger than the English one mentioned above, are of far greater importance to the history of the game.

The first clubs established outside Great Britain were the Calcutta Golf Club of East India, established in 1829, and the Royal Bombay Club, incorporated in 1842. Another club was in full vigor in Madras at a somewhat later date. The next foreign settlement was at Pau, in southern France, where numerous Scotchmen were in search of health. It was not until 1864 that the invasion of England proper began, with the establishment of the Golf Club of Westward Ho, in Devonshire, followed in the next year by the London Scottish, at Wimbledon; and shortly afterward by the Hoylake, at Liverpool; and then by hundreds of others throughout the country. Canada caught the infection in the early seventies, resulting in the organization of the Royal Montreal Golf Club in 1873.

In the United States, New York was the first to take up the game, although it is stated that the game of golf was played on the Pacific coast by a band of old sea captains in the sixteenth century. The St. Andrews Golf Club was the first formed in the United States (Nov. 18, 1888), followed almost immediately by others throughout the country, so that at the beginning of the twentieth century public links were to be found in the public parks of the large cities, and nearly every town and village in the country had its public or private golf links.

The game was played with a ball made of gutta-percha having a diameter of 1¾ inches and weighing from 25 to 28 pennyweights. Previous to 1848 the balls had been made of leather stuffed with feathers, and the manufacture was very difficult. During that year the gutta-percha ball was invented and remained in vogue for many years, until the advent of the rubber-cored ball. Many golfers believed that the old gutta-percha ball was better than the present rubber-cored; so a match was planned in England during the latter part of March, 1914, which resulted in a decisive victory for the rubber-cored. Four of England's leading professionals were chosen to participate in the match. The loss of distance to the rubber-cored ball was not great in the driving, but the difference was felt in the second shots, especially when the players using rubber cores could get up comfortably with irons. Their opponents had to slug desperately hard and even then were generally short. In playing the gutta-percha ball every ounce of power had to be utilized, and at the end of the round the gutta-percha professionals were dead. In the afternoon the sides were changed so as to eliminate as much as possible the personal equation.

Golf is played over a course laid out on an open stretch of country, and the object is to hit the ball into each of the holes made for its reception successively in the fewest number of strokes. These holes are about 4 inches in diameter, usually lined with iron to keep them from getting too large, while a flag at each indicates to the golfer the correct direction. The number of holes is usually 18, but where the area available is limited, a nine-hole course is played twice. The distance of each hole from the tee depends upon the nature of the intervening land; from 110 to 650 yards is the usual limit. In laying them out advantage is taken of such natural obstacles to straightforward play as ditches, walls, trees, hills, roads, or hollow places, so as to break up the total length into difficult portions, compelling the player to exercise judgment and skill. If there are no natural obstacles or hazards, artificial ones are introduced, such as traps made by hollowing out the earth and leaving it loose like sand in front of a hole, or an embankment raised at some selected spot, called a bunker. The game is played by one, two, three, or four persons in either "medal" or "match play." In the former all the strokes of the game on each side are added together at the end of the 18 holes, and the side which has completed the round in the lowest number of total strokes wins; or, if match play, each hole is counted separately to the one who makes it in the fewest strokes, the winner being the one who has most holes to his credit.

The play is begun by one player teeing, or placing his ball on the tee, which is usually a section of ground about 10 feet in diameter, either sand or turf, and striking it with one of his clubs, usually the driver, such a distance as will best land it in a favorable place for the next stroke. Then his opponent drives off, and they both proceed to where their respective balls have fallen. In the ensuing strokes, and the choice of clubs with which to make them, the players must be guided by conditions—the length of the hole, the conformations of the ground to be covered, and the obstacles to be safely passed. The game is divided into three parts—distance shots, approaching, and putting. For the distance shots three clubs are generally used—the driver and the brassie, made of wood, and the driving iron, made of steel. When the ball has been driven to within 100 or 150 yards of the hole, the approach shot, of which the object is accuracy rather than distance, may be made by using the mid-iron, mashie, or mashie-niblick. Around the hole the grass is cut short and the ground made as level as possible. This is called the putting green. Putting, the third department of the game, consists of tapping the ball lightly with a short club with the object of rolling the ball into the hole. The conventional set of clubs consists of the driver, brassie, cleek, mid-iron, mashie, niblick, putter, and driving iron. There are, however, variations of these types, such as the spoon, hollow-faced cleek, jigger, mashie niblick, putting cleek, and many other modern clubs.

The rules are based upon those of the St. Andrews Golf Club of Scotland. Players are of two classes, professional and amateur, and the national championships are three—one for men (amateurs), one for women (amateurs), and an open championship for amateurs and professionals.

In America the central authority is the United States Golf Association, organized Dec. 22, 1894, when it consisted of the Chicago Golf Club, the Country Club of Brookline, the Newport Golf Club, and the St. Andrews Golf Club of Yonkers. It now (1914) consists of nearly 200 clubs, and there are subsidiary associations, the Metropolitan, Western, Southern, Intercollegiate, Western Pennsylvania, Florida, and Trans-Mississippi associations, the League of the Lower Lakes, the Pacific Northwest, New Jersey State, Indiana State, and several women's associations. Not included in these associations are hundreds of separate clubs. There are over 750,000 golfers in the United States.

In the men's amateur championship the entries are reduced by a preliminary sifting at medal play to the 64 lowest. These then play match play every consecutive day, whereby the numbers are day by day reduced, first to 32, then to 16, then to 8, then to 4, and finally to 2, the finals. The woman's championship is not so exhaustive as the men's. In it the entries are reduced by one round at medal play to 32, who thereafter meet at match play in a round of 18 holes every consecutive day, as in the former case. In England there is sometimes more than one course played over, usually due to the number of entries. The open championship is a contest of four times round the links, 72 holes, at medal play.

Consult: Clark, *Golf: A Royal and Ancient Game* (New York, 1899); Lee, *Golf in America* (ib., 1895); Vardon, *Complete Golf* (ib., 1905); H. G. Hutchinson, *Golf Greens and Green Keeping* (London, 1906); G. W. Beldam, *Great Golfers* (ib., 1907); W. W. Tulloch, *Life of Tom Morris, with Glimpses of St. Andrews and its Golfing Celebrities* (ib., 1907); Hilton and Smith, *The Ancient and Royal Game of Golf* (ib., 1912); A. V. Taylor, *Origines Golfianæ* (Woodstock, Vt., 1912); James Braid, *Advanced Golf* (Philadelphia, 1908); Arnold Haultain, *The Mystery of Golf* (2d ed., New York, 1910); H. G. Hutchinson, *The New Book of Golf* (ib., 1912); Jerome D. Travers, *The Travers Golf Book* (ib., 1913).

GOLGI, gôl′jē, CAMILLO (1844–). An Italian histologist and neurologist, born in Corteno and educated at the University of Pavia. He studied medicine, practiced at Abbiategrasso, and was professor at Siena and then at Pavia, where he was director of the histological and general pathological cabinet. In 1870 he first used silver nitrate to color nervous structure and about 1885 revolutionized the theory of nervous physiology by proving that there was not a net, but only an interlacement, of nerves. A class of nerve endings found in tendons are called the "organs of Golgi." His most important work in pathology was the discovery of three varieties of malaria parasite. In 1906 he divided the Nobel prize for medicine with Cajal. His collected works appeared in three volumes in 1903—the first and second on histology, the third on pathology. He wrote for the great Italian medical encyclopædia and for Italian medical journals.

GOL′GOTHA. See HOLY SEPULCHRE.

GO′LIAD. A town and the county seat of Goliad Co., Tex., 134 miles south of Austin, on the San Antonio River, and on the Galveston, Harrisburg, and San Antonio Railroad (Map: Texas, D 5). It contains a fine courthouse and interesting remains of the old Spanish mission, La Bahía. The town has cotton gins, whose products with live stock constitute a considerable trade. Pop., 1914 (local est.), 2250. Here in 1747 was established the mission Espíritu Santo de Zuñiga, and the presidio of Santa María de Loreto del Espíritu Santo, generally known as La Bahía, which had been founded about 1722 on the site of La Salle's Fort St. Louis and removed to the Guadalupe River about 1727. In 1829 the place was raised to the rank of a villa and was named Goliad (Goliath). In 1812–13, during the war between Mexico and Spain, Gutierrez was besieged here for a short time by a large Spanish force; on Oct. 9, 1835, the place, then garrisoned by a Mexican force of about 50, was captured by an equal number of Texans under Captain Collingsworth. On Dec. 20, 1835, a declaration of Texan independence was made here, several months before the official declaration was made at Washington (Texas), and on March 27, 1836, in what is known as the "massacre of Goliad," more than 300 Texans and Americans under Colonel Fannin were murdered near here in cold blood by the Mexicans, at Santa Anna's orders. See FANNIN, JAMES W.

GO'LIAR'DIC LITERATURE, or CARMINA BURANA. The songs of the wandering students in the later Middle Ages. These called themselves Goliardi, i.e., children or followers of Golias. Nothing is definitely known about this Golias. By some the poems bearing his name have been attributed to Walter Mapes, but there is no possibility that the songs of the Goliards represent the creation of any one man or even of a few men. They bear the stamp of universality. A song, originally sung by one poet or rhymester, was adopted, changed, resung, by others, until it became the common property of the student body. The poems as a whole may be divided into two general classes. The first class comprises the satirical songs. With the impatience and enthusiasm of youth the students attacked the vices of all classes except their own, and the members of the Church fared worst. Their poems are exceedingly irreverent to the ecclesiastical dignitaries, and this fact alone was sufficient to prevent any author from putting his name to his verses. In the second class the noticeable facts are the purely pagan spirit, the love of outdoor life, the zest for enjoyment, the feeling that all things which yield pleasure are lawful. Their themes are three—nature, wine, and women—all of which they loved ardently. Some of their songs are popular at the present time. The German Corps students still sing at the grave of a departed brother, *Gaudeamus igitur, juvenes dum sumus.* The best known of the drinking songs is *Mihi est propositum in taberna mori.* The *Lauriger Horatius* is believed to be the work of the Goliardi. Consult: Symonds, *Wine, Women, and Song* (London, 1884); Schmeller, *Carmina Burana* (3d ed., Breslau, 1894); Wright, "Latin Poems Commonly Attributed to Walter Mapes," in *Camden Society Publications* (London, 1841); Pernwerth von Bärnstein, *Carmina Burana Selecta* (Würzburg, 1879); Haessher, *Die Goliardendichtung und die Satire im 13. Jahrhundert in England* (Leipzig, 1905); Lundius, *Deutsche Vagantenlieder in den Carmina Burana* (Kiel, 1907); Wright, *History of French Literature* (New York, 1912).

GOL'IAS. See GOLIARDIC LITERATURE.

GOLI'ATH. A Philistine giant, born in Gath, and slain by a Judæan hero. According to 1 Sam. xvii, it was the youthful David who killed this giant, felling him with a stone from his sling and cutting off his head with the fallen champion's sword. (See DAVID.) An older and more reliable tradition ascribes the deed to one of David's warriors, Elhanan, of Bethlehem (2 Sam. xxi. 19). If this Elhanan is identical with Elhanan ben Dodo, of Bethlehem, mentioned in 2 Sam. xxiii. 24, his father's name, Dodo, is omitted in 2 Sam. xxi. 19, and the reading "Jairi," "the Jairite," indicating the clan to which he belonged, should be preferred to "Jair," supposed to be the name of his father. In that case the name of Dodo and the birthplace may have facilitated the transfer of the story to David. It is a common occurrence, however, that a famous king receives the credit for deeds done by his men. In 1 Chron. xx. 4–8, Elhanan is said to have slain Lahmi, the brother of Goliath, and in the Authorized Version the words "the brother of" are introduced, without the slightest warrant either in the Hebrew text or the ancient version, to accord with this. By a comparatively slight emendation, which fortunately the Samuel text escaped, the Chronicler or a later copyist harmonized the two narratives.

GOLIATH BEETLE. Any of several huge cetonian beetles of the family Scarabæidæ and genus *Goliathus,* specifically *Goliathus giganteus,* which is about 4 inches long by 2 inches wide. This species is West African, and according to Uhlet is subject to so much variation that several names have been given to its varieties. It is generally chalky white, with velvety-black markings, prominently six black lines on the prothorax. These beetles frequent the tops of forest trees and are said to feed on the sap. They are near allies of the Hercules beetles (q.v.).

GOLITZIN, gō-lĭts'ĭn, or **GALITZIN.** A princely family of Russia, tracing its descent from Gedimin, Grand Prince of Lithuania, ancestor of the Jagellon kings of Poland.—PRINCE MIKHAIL GOLITZIN was a celebrated military commander under Basil IV, Grand Prince of Moscow. He fought in the Crimea and in Lithuania and in 1514 led an army against the Poles. He was defeated at Orsha and taken prisoner, remaining in captivity until 1552. He died in a convent at Moscow soon after his release.—VASILY VASILYEVITCH GOLITZIN, great-grandson of Mikhail, played an important rôle at the time of Boris Godunoff and the false Demetrius. He was sent as Ambassador to Poland with the offer of the Russian crown for Prince Ladislas, but was cast into prison by the Poles, and died in 1619.—BORIS ALEXEYEVITCH GOLITZIN (1641–c.1713) was the preceptor of Peter the Great and one of the regents of the Empire during Peter's travels abroad. He became subsequently Governor of Kazan and Astrakhan and enjoyed great favor with the Czar.—VASILY VASILYEVITCH GOLITZIN, known as the Great (1643–1714), distinguished himself in military operations against the Cossacks of the Dnieper, gained the title of Ataman, and after 1680 was Minister of State. He was the lover of Sophia, sister of Peter the Great, who acted as regent during the young ruler's minority. As such, Golitzin was the virtual ruler of Russia, carrying on the government with great ability and firmness. He made the beginnings of military reform, thus preparing the way for the thorough organization of the army by Peter the Great. Upon the assumption of the government by Peter in 1689, Vasily suffered disgrace and was banished to Siberia, where he died. (Consult R. N. Bain, *The First Romanoffs,* London, 1905.)—DMITRI GOLITZIN (died 1738) was Russian Ambassador to Turkey and Austria and subsequently Superintendent of the Imperial Finances. He was one of the leaders of the aristocratic party which, upon the accession of Anna Ivanovna (q.v.), sought to impose a constitution upon the Empress by the terms of which the chief power would have been vested in the hands of a small faction of the nobility. The attempt, however, failed, and Dmitri died in prison at Schlüsselburg.—Mikhail Golitzin (1674–1730), brother of Vasily, entered the army at the age of 12 and early distinguished himself against the Turks. In 1700 he commanded a Russian corps, operating against the Swedes in Lithuania; in 1708 he gained the important victory of Lyesnaya and in 1714 overran Finland and was Governor of the country until 1721, in which year he conducted the negotiations leading to the Peace of Nystad. Golitzin was one of the greatest generals Russia has ever produced and a man of many abilities and admirable character. As Governor of Finland, his conduct was marked by such justice and kindliness as to gain him, from a conquered population, the title of *Finskibog* (Godhead of the Finns).—Alexander Mikhailovitch Golitzin (1718–83), son of Mikhail, after acting in the diplomatic service of Russia at Constantinople and Dresden, entered the army and fought with distinction in the Seven Years' War. In 1769 he took Khotin from the Turks. He was subsequently Governor of St. Petersburg and field marshal.—Dmitri Alexeyevitch Golitzin (1735–1803) was a well-known diplomat and man of letters. From 1765 to 1773 he was Russian Ambassador at Paris, where he lived in close touch with Voltaire and other literary men of the time. In 1773 he became Ambassador at The Hague, whence, on the outbreak of the French Revolution, he retired to Germany, where he devoted himself to the study of the physical sciences. He wrote: *Description physique de la Tauride* (1788); *Traité de minéralogie* (1792); *L'Esprit des économistes* (1796).—His wife, Adelheid Amalie (1748–1806), was a fervent Catholic. She made her home at Münster and became the centre of a band of religious enthusiasts and mystics, whose efforts were directed towards counteracting the prevailing materialism of the age. Her son Dmitri was a Catholic missionary in the United States. (See Gallitzin, Dmitri.)—Alexander Nikolayevitch Golitzin (1774–1844) was one of the most influential counselors of Alexander I, with whom he had been brought up. He became Procurator of the Holy Synod in 1803 and from 1817 to 1824 was Minister of Education and Public Worship. His liberal views aroused the opposition of the conservative element among the clergy, and with the accession of Nicholas I he lost all influence. (Consult Angelo S. Rappoport, *The Curse of the Romanovs*, London, 1907.)—Emanuel Mikhailovitch Golitzin (1804–53) was born in Paris and studied at the Ecole Polytechnique under Gay-Lussac. He entered the Russian army in 1825 and distinguished himself at the storming of Varna (1828), but retired from the army in the following year. He led a life of dilettante scholarship in the capitals of western Europe, his chief interest lying in geography. He contributed to the *Bulletin de la Société de Géographie* in Paris and translated Ferdinand von Wrangel's *Voyage to Siberia* from the Russian. He also wrote *La Russie du 17ème siècle dans ses rapports avec l'Europe occidentale*, which was published two years after his death.—Nikolai Sergeyevitch Golitzin (1808–92) entered the army in 1825 and rose to be lieutenant general. He wrote *A Military History of the World from the Most Ancient Times* (13 vols., 1872 et seq.).

GOLIUS, gō'lĭ-ụs, Jacobus (1596–1667). A Dutch Orientalist and mathematician, born at The Hague and educated at the University of Leyden. In 1624 he became professor of Arabic at Leyden and in 1629 professor of mathematics. He wrote *Lexicon Arabico-Latinum* (1653).

GOLLANCZ, gŏl'ăn̲ks, Israel (1864–). An English scholar, professor of English literature in King's College, University of London, and secretary of the British Academy. He was born in London, graduated from Cambridge (B.A., 1887; M.A., 1891), became lecturer in English at University College, London (1892–95), and lectured in university extension courses and at Cambridge. He edited and translated many Old and Middle English texts, as the *Pearl* (1891), Cynewulf's *Christ* (1892), and the *Exeter Book* (1895). He edited the *Temple Shakespeare* (1894–96) and *Hamlet in Iceland* (1898). In 1913 he was, as he had been for some years previous to that date, general editor of *The King's Library*.

GOL'OMYN'KA. See Oil Fish; Baikal.

GOL'ONDRI'NA. The common green house-swallow (*Tachycineta leucorrhoa*), abundant everywhere south of the Amazonian forests. It is closely related to the white-bellied tree swallow of the United States, and, like that and other species, has forsaken its native wildness and custom of nesting in hollow trees for intimate association with men, and nest making beneath the eaves of buildings. It is richly green, with a white breast and rump. Many interesting things are related of it by Hudson, *Naturalist in La Plata* (4th ed., London, 1903). See Swallow.

GOLOSHES, gô-lŏsh'ĕz (Fr. *galoche*, ML. *calopedes*, Gk. *καλοπόδιον*, from *κᾶλον*, *wood* + *πούς*, *foot*). Originally wooden sandals or shoes; later, large, high overshoes; now, warm and heavy overshoes of rubber and cloth, buckling around the ankle. See Shoes.

GOLOVATSKY, gō'lô-văt'skê, Yakov Feodorovitch (1814–88). A Russian (Ruthenian) ethnographist, born in Czepiele, eastern Galicia. After study at Pest and Lemberg, he became professor of the Russian language and literature at the University of Lemberg in 1848. From 1867 he resided in Russia. His chief work is a collection of the folk songs of the Russian peoples in Galicia, Hungary, and Bukowina, *Narodnyia pěsni Galiekoi i Ugorskoi Rusi* (1878).

GOLOVNIN, gô-lŏv-nēn'. A native settlement on Golovnin Bay, Alaska, 10 miles east of Bluff. It has a population of about 200. The United States maintains a school, and the Swedish Evangelical Union conducts a mission. The natives have reindeer herds exceeding 2000 head. See Seward Peninsula, Alaska.

GOLOVNIN, Vassili Mikhailovitch (1776–1831). A Russian sailor and explorer, born at Ryazan. He served in the English navy under Nelson and Cornwallis, and on his return to Russia in 1806 was put in command of the sloop *Diana* to make a trip of exploration around the world. In 1811 he was captured in Japan and kept prisoner until 1813. A second trip around the world was made (1817–19) in the Russian corvette *Kamchatka*. From 1821 till his death he held the highest positions in the Russian navy, dying with the rank of vice admiral. His complete works, which contain descriptions of both voyages and of his adventures while in captivity, were published in five volumes at St. Petersburg in 1864. Golovnin Bay and Golovnin Sound, in Bering Sea, are named for him.

GOLP, or **GOLPE.** A heraldic charge. See Heraldry.

GOLTERMANN, gôl′tẽr-mȧn, Georg Eduard (1824–98). A German violoncellist and composer. He was born at Hanover and received his musical education under Prell, Menter, and Lachner. After completing his studies he traveled for two years giving concerts, in which he frequently performed his own highly successful compositions. In 1852 he received a position as musical director at Würzburg and in the following year was appointed assistant conductor of the orchestra of the Stadttheater at Frankfort on the Main, of which he became chief conductor in 1874. Besides a symphony (1851) and two *Festspiel-Overtures* (op. 24 and 94), his compositions include sonatas, songs, and numerous works for the violoncello.

GOLTHER, gôl′tẽr, Wolfgang (1863–). A German writer on ancient and mediæval German legends. He was born in Stuttgart and was educated at the University of Munich. In 1895 he became professor of German philology at Rostock, where he was rector of the university in 1909–10. He wrote: *Das Rolandslied der Pfaffen Konrad* (1887); *Die Sage von Tristan und Isolde* (1887); *Studien zur germanischen Sagengeschichte* (1888); *Geschichte der deutschen Litteratur in Mittel-Alter* (1891); *Deutsche Heldensage* (1894; 2d ed., 1909); *Götterglaube der Germanen* (1894; 2d ed., 1911); *Handbuch der germanischen Mythologie* (1895); *Die sagengeschichtlichen Grundlagen der Ringdichtung Richard Wagners* (1902); *Wagner als Dichter* (1904); *Altnordische Litteraturgeschichte* (1905); *Religion und Mythus der Germanen* (1909); *Die deutsche Dichtung im Mittel-Alter* (1912); *Parsifal und der Gral* (1913); and edited various early texts and Richard Wagner's letters and (1914) his collected works.

GOLTZ, gōlts, Alexander D. (1857–). An Austrian historical and decorative painter. He was born in Hungary, of German parentage, but was brought up in Vienna. Beginning to paint at his fourteenth year, he studied in the academies of Vienna and Munich, especially under Feuerbach, and at Paris with Puvis de Chavannes. One of the most prominent contemporary painters of Austria, he is represented especially in the museums of Vienna: in the Hof Museum by "Christ and the Women," in the Municipal Museum by "A Peasant Madonna," and in the Moderna Gallerie by "Vintage in Lower Austria." He is widely known as a decorative painter, having painted the curtains of the court theatre at Wiesbaden, and of the city theatre at Salzburg, and decorated the aula of the University of Graz. He painted, besides, many portraits and figures, and landscapes, chiefly of his home in Lower Austria.

GOLTZ, August Friedrich Ferdinand, Count von der (1765–1832). A Prussian statesman, born at Dresden and educated at Leipzig and Frankfort on the Oder, where he studied law. He was Prussian Ambassador to Denmark, Sweden, and Russia; was the Plenipotentiary of Prussia at the Congress of Erfurt (1808); and concluded the last negotiations (1812) with France under direction of Hardenberg. After the termination of the Napoleonic wars he was appointed Prussian Councilor of State (1817), and was member of the Bundestag of Prussia in 1817–24.

GOLTZ, Bogumil (1801–70). A German humorist, satirist, and moral philosopher. He was born in Warsaw, attended the Gymnasia at Marienwerder and Königsberg, studied agriculture from 1817 to 1821, and for a time attended lectures on philosophy and philology at the University of Breslau. In 1823 he purchased, near Thorn, an estate which he subsequently abandoned to settle in Gollub and devote himself to the study of literature and æsthetics. In 1847 he removed to Thorn, whence he made extensive travels and where he died. In 1847 appeared his *Buch der Kindheit,* in which, with a mystic tenderness akin to that of Jean Paul, he depicts the impressions of his own childhood. This was followed by *Ein Jugendleben* (1851), in similar vein. *Der Mensch und die Leute* (1858) is a penetrative and peculiarly original study of various races, *Die Deutschen* (1860) revealing the same method applied to the German national genius. He was a profound though eccentric thinker; but his style, though often spirited, lacks technical finish and frequently displays the grotesqueness of Jean Paul without the latter's imagination. His further works include: *Ein Kleinstädter in Aegypten* (1853); *Typen der Gesellschaft* (2 vols., 1860); *Feigenblätter* (1861–64); *Die Bildung und die Gebildeten* (1864); *Die Weltklugheit und die Lebensweisheit* (1869).

GOLTZ, Friedrich (1834–1902). A German physiologist, born at Posen. He was educated at Königsberg and was there appointed a professor in 1865. In 1870 he became professor of physiology at Halle and from 1872 to his retirement in 1901 occupied a similar chair at Strassburg. His most important researches concern the functions of the nerve centres and in particular reflex nervous action. His writings include: *Beiträge zur Lehre von den Funktionen der Nervencentren des Frosches* (1869) and many contributions to the *Archiv für pathologische Anatomie, Physiologie und klinische Medizin* of Virchow.

GOLTZ, Kolmar, Baron von der (1843–1916). A German soldier and military author. He was born at Bielkenfeld, East Prussia, was educated at the Military Academy, Berlin, and served in the Austro-Prussian War of 1866. After the Franco-German War, in which he participated, he was appointed to the historical department of the general staff at Berlin and subsequently became instructor in the Military Academy. He resigned from the German service in 1883 and entered that of Turkey, where he conducted the department of military education until 1896. In that year he returned to Germany and was made general of division. He became general of infantry in 1900, commander of the First Army Corps in 1902, in 1907 general inspector of the Sixth Army Corps, in 1908 lieutenant general, and in 1908–10 he reorganized the Turkish army. Made general field marshal in 1911, he was afterward general inspector of the Second Army Corps until 1913. In August, 1914, he was appointed military governor of Belgium after the German armies had successfully invaded that country and captured Brussels. (See War in Europe.) His works include: *Léon Gambetta und seine Armee* (1877; also translated into French, 1877); *Das Volk in Waffen* (4th ed., 1890); *Der thessalische Krieg und die türkische Armee* (1898); *Krieg- und Heerführung* (1901); *Von Jena bis Eylau* (1907); *Kriegsgeschichte Deutschlands im XIX. Jahrhundert* (1910).

GOLTZ, Max, Baron von der (1838–1906).

A German naval officer, born at Königsberg. He entered the Prussian marine in 1853, was appointed naval ensign in 1859, in 1870 was detailed for service in the Ministry of Marine, and in 1875 attained the rank of captain. During the disturbances in Egypt in 1882 he was commanding officer of Germany's Mediterranean squadron, in 1888 became vice admiral and commander of the Wilhelmshaven Naval Station, and in 1895 was retired, with the rank of admiral, at his own request.

GOLTZ, Theodor, Baron von der (1836–1905). A German agriculturist, born at Coblenz and educated at Erlangen and Bonn. In 1862 he was appointed instructor at the Royal Academy of Waldau, East Prussia, into which province he introduced the first agricultural schools. He was professor of agriculture at Königsberg from 1869 to 1875, when he was appointed director of the Agricultural Institute in that city. In 1885 he was made professor of agriculture at Jena and in 1895 at Bonn. His publications include: *Die landwirtschaftliche Buchführung* (9th ed., 1903); *Landwirtschaftliche Taxationslehre* (3d ed., 1903); *Agrarische Aufgaben der Gegenwart* (2d ed., 1895); *Leitfaden der landwirtschaftlichen Betriebslehre* (1897; new ed., 1911); *Vorlesungen über Agrarwesen und Agrarpolitik* (1899); *Handbuch der landwirtschaftlichen Betriebslehre* (1896; 4th ed., 1912); *Geschichte der deutschen Landwirtschaft* (1902–03).

GOLTZIUS, gŏl′tsĭ-ụs, Hendrik (1558–1616). A Dutch line engraver and painter. He was born at Mülebrecht, near Venloo, of a family of artists. He was a pupil of Coornheert, and of Philip Galle, at Haarlem, where he later set up as a printer. In 1850 he began a tour of several years through Germany and Italy; he was much influenced by Michelangelo. In his later years he executed several paintings in a mannered Italian style, much inferior to his engravings. In his command of the burin Goltzius was hardly surpassed by Dürer himself, although he lacked the latter's imagination and invention. He made great progress in the plastic treatment of engraving, his modeling being especially fine. His remarkable ability to adapt his technique to any style is evinced in his six master prints: "The Annunciation," after Raphael; "The Visitation," after Parmeggiano; "The Adoration of the Shepherds," after Bassano; "The Holy Family," after Baroccio; "The Adoration of the Kings," after Lucas van Leiden; and "The Circumcision," after Dürer. However excellent in technique, most of his engravings, of which about 330 survive, are mannered in form and hollow in content. His engraved portraits, however, are excellent in finish as in characterization. One of the best is the life-size portrait head of the artist himself.

GOLUCHOWSKI, gŏl′o͞o-kŏv′ski, Agenor, Count von (1812–75). An Austrian statesman, born in Galicia and educated at the Jesuit Convent of Tarnopol and at Lemberg. He entered government service and was Governor of Galicia from 1847 till 1859, when he was made Minister of the Interior. He gave up this position in 1860 and the next year entered the House of Lords. In 1866–67, and from 1871 until his death, he was again Governor of Galicia and very active in favoring the thorough Polonization of the province.

GOLUCHOWSKI, Agenor, Count (1849–). An Austrian statesman, son of the preceding. He was early in the diplomatic service as attaché at Berlin (1872), attaché and counselor at Paris, and Minister at Bucharest (1887–94). As Austro-Hungarian Minister of Foreign Affairs (1895–1906), he made the maintenance of the Triple Alliance and especially of close relations with Germany the basis of his policy; temporarily, as it proved, he adjusted with Russia Balkan difficulties; he arranged for concerted action of the European powers during the Armenian difficulties of 1896, and again in 1902 urged joint action in obliging the Sultan to grant reforms in Macedonia. In 1905 he also led the concert of Powers in forcing Turkey by an international naval demonstration to accept European control of Macedonian finances. The Hungarians, who hated Goluchowski, finally compelled him to retire from the ministry.

GÓMARA, gŏ′mä-rȧ, Francisco López de (1510–c.1559). A Spanish historian, born at Seville. He studied at the University of Alcalá and became professor of rhetoric there. Leaving the university, he took orders and about 1540 became secretary and chaplain to Hernando Cortés. In this capacity he may have gone with him to America, but it is not probable. He wrote one of the first histories of America, which, however, is not reliable. The title of the work is *Historia general de las Indias con la conquista de Méjico y de la Nueva España* (1552–53). The second part of this work described Mexico and was reprinted as a separate volume, *Crónica de la Nueva España, con la conquista de México . . .* (1554). A modern edition, with a biography, is in the *Biblioteca de autores españoles*, vol. xxii (Madrid, 1884).

GO′MARUS, Francis (1563–1641). The most strenuous opponent of Arminius. He was born at Bruges, Jan. 30, 1563, studied at Neustadt, Heidelberg, Oxford, and Cambridge, where he received the degree of B.D. in 1584. He was pastor of the Reformed church at Frankfort from 1587 till 1594, when he became professor of theology at Leyden. Here he signalized himself by his vehement opposition to the views of Arminius, who became his colleague in 1603. In the disputation at The Hague in 1608 his zeal was very conspicuous; and at the Synod of Dort (1618–19) he was mainly instrumental in securing the expulsion of the Arminians from the Reformed church. Gomarus resigned his professorship when, after the death of Arminius, an Arminian was appointed to the vacancy (1609). He was professor at Saumur (1614–18) and at Groningen from 1618 till his death (Jan. 11, 1641). Though prejudiced, even bigoted, and more Calvinistic than Calvin himself, nevertheless Gomarus was a man of learning, and not the contentious personage he is sometimes represented. His works were published at Amsterdam after his death (1645). Those who sided with Gomarus in the Arminian controversy are often called, from his name, Gomarists. See Arminius, Jacobus; Arminianism; Dort, Synod of.

GOM′BERG, Moses (1866–). An American chemist. He was born at Elizabetgrad, Russia, where he was educated at the Gymnasium; in 1890 he graduated from the University of Michigan (M.S., 1892; Sc.D., 1894); and he also studied at the universities of Munich (1896–97) and Heidelberg (1897). At the University of Michigan he became instructor in chemistry in 1893, assistant professor of organic chemistry in 1899, junior professor in 1902, and full professor in 1904. He is author of contributions to the *Journal of the American Chemical Society*, the *Berichte der Deutsche Chemische Gesellschaft*, and other periodicals, dealing especially with quino-carbonium sals, tetraphenylmethene, and trivalent carbon.

GOMBERVILLE, gôɴ′bâr′vêl′, Marin Le Roy, Sieur du Parc et de (1600–74). A French novelist of considerable imaginative originality, one of the first to make the novel a vehicle of exotic and geographic description and of historic information. He was born in Paris and was a wealthy nobleman, a cherished member of the Précieux bluestocking circle, to whose vocabulary he contributed some gems, as may be seen from Somaise's *Dictionnaire des précieuses.* While still a youth, he wrote *Carithée* (1621), whose heroine furnished the type for Sorel's burlesque Dulcinea in the *Berger extravagant.* Eleven years later Gomberville published the first draft of *Polexandre* (1632), which he extended in 1634 by the injection of a story of Mexican adventure, and, since this piqued curiosity, he again greatly extended the story in 1637. Meantime Gomberville had aided in founding the Academy. A few years later he fell under the influence of Port-Royal, and, in penitential regret for having amused a worldly generation, he published *Young Alcidiane* (1652). He was a facile polygraph, but *Polexandre,* which in its final shape contains 4409 closely printed pages, is his only significant work. It rejuvenated the interest in the romance of chivalry by transporting it to the New World in a generation whose imagination was intoxicated by strange voyages and undreamed-of conquests. The story is almost wantonly inartistic, but Gomberville is the first important pedagogue of fiction, bent on remolding the "perfect lives" of the old romances into a model for the gentlemen of the seventeenth century. He died in Paris, June 14, 1674. Consult Körting, *Geschichte des französischen Romans im XVII. Jahrhundert,* vol. i (2d ed., Oppeln, 1891), and R. Kerviler, *Marin Le Roy de Gomberville* (Paris, 1876).

GOM′BO. See Hibiscus.

GOMBROON′. See Bender Abbas.

GOMEL, gō′mĕly′, or **HOMEL.** A district town of the Russian Province of Mohilev, situated on the Soje, an affluent of the Dnieper, about 113 miles southeast of Mohilev (Map: Russia, D 4). It is the centre of the Russian hop industry, lies on two railway lines, has a number of sugar refineries, paper and oil mills, and a good river trade with Mohilev and Kiev. Pop., 1897, 36,846; 1911 (est.), 47,000, mostly Jews. There was a massacre of Jewish inhabitants in September, 1903.

GO′MER. The form of powder chamber generally used in smoothbore guns. It was in the form of the frustum of a cone with a hemispherical end, the base of the cone joining the cylinder of the bore. The name was derived from that of its inventor.

GO′MER (Heb.; Ass. Gimirrai, Bab. Gimiri, Gk. Κιμμήριοι, *Kimmērioi,* Lat. Cimmerii, Armen. Gamir). An ancient people, probably belonging to the Iranian family of nations. About the beginning of the first millennium B.C. they lived on the northern shores of the Black Sea. Here Homer locates them (*Odys.,* xi, 14). In the reign of Sargon II (722–705) they appear in Asia Minor, where they threaten the Kingdom of Urartu (see Chaldians), according to letters sent by Sennacherib to Sargon, and the letters of one of his generals. In the reign of Esarhaddon (681–668) the Cimmerians were forced by the Scythians, who were in league with the Assyrians, farther west. They fell upon Phrygia and put an end to the kingdom of Midas. When attacked by the Cimmerians, Gyges, King of Lydia (689–655), appealed for help to Asurbanipal (668–625), sending to the Assyrian court a couple of Cimmerian prisoners "whose language no interpreter understood." Sardis was besieged by the Cimmerians (c.657 B.C.), and Gyges fell in the battle with them (c.655 B.C.). In the time of Ardys (655–625), who entered into closer relations with Assyria, the Cimmerians were finally crushed in a great battle in Cilicia, near the Mediterranean. Remnants of them survived in Cappadocia, which was called by the Armenians Gamir. In Gen. x. 2, 3, Gomer appears as the son of Japhet (q.v.). Consult: Rogers, *History of Babylonia and Assyria* (New York, 1900–01); Winckler, *Altorientalische Forschungen,* vol. i (Leipzig, 1897); id., *Die Keilinschriften und das Alte Testament* (3d ed., Berlin, 1902); Alfred Jeremias, *Das Alte Testament im Lichte des Alten Orients* (Leipzig, 1906); Ed. Meyer, *Geschichte des Altertums* (3d ed., Stuttgart, 1913).

GOMERA, gȯ-mā′rȧ. One of the Canary Islands, situated 20 miles west of Teneriffe, in lat. 28° 6′ N. and long. 17° 8′ W. (Map: Portugal, F 5). Area, 145 square miles. It is of volcanic origin, like the whole archipelago, and has no good harbors. Its elevations, which in some parts of the interior approach 4000 feet, are well wooded with bay and palm trees. Dromedaries are bred, and the chief industry is cattle raising. Some silk and potatoes are exported. Pop., 1900, 15,358; 1910, 19,736. Chief town, San Sebastián de Gomera; pop., 3187.

GOMES DE AMORIM, gō′mĕsh dȧ ä′mȯ-rēɴ′, Francisco (1827–91). A Portuguese poet and dramatist, born at Avelomar (Minho). Born in poverty, he was sent to Brazil early in life, where he was compelled to labor under severe conditions, yet he found time to study the language and customs of the wild peoples in the primeval forests bordering the Amazon and the Xingu. In 1846 he returned to Portugal; in 1848 wrote "Garibaldi," "A liberdade," and other verses in celebration of that revolutionary year; and though at first compelled for support to learn the hatter's trade, he obtained a post in the government service in 1851 and in 1859 was appointed librarian to the Ministry of Marine and curator of the Museum of Naval Antiquities. In his literary career he was much encouraged by Almeida-Garrett (q.v.), whose *Camões* he read in Brazil, and in regard to whom he wrote the appreciative *Memorias biograficas* (1881), which is in fact a history of the literary movement represented by Garrett. The volumes of poems, *Cantos matutinos* (3d ed., 1874) and *Ephemeros* (2d ed., 1866), were followed by a series of dramas—*Odio de raça, A prohibição, Figados de tigre, Os incognitos do mundo, Ghigi, A viuva,* and others—many of which, like *O cedro vermelho* (with a commentary), are derived from Brazilian life. The works of fiction *Os selvagens* (1875), and its sequel, *O remorse vivo* (1876), have the same source. There is a collected edition of Gomes's works in Portuguese (Lisbon, 1866 et seq.), and several of the dramas have been rendered into French by Richon and Denis. Consult Reinhardstoettner, *Aufsätze und Abhandlungen* (Berlin, 1887).

GÓMEZ, gō′mås, Antonio. See Orsini, Felice.

GÓMEZ, Estevan (c.1474–c.1530). A Portuguese navigator. In 1519 he started from Spain with Magellan, as pilot on the *Trinidad,* of which vessel Magellan himself acted as captain; but in the Strait of Magellan he commanded a successful mutiny on the *San Antonio,* to which vessel he had been transferred, and, leaving the rest of the fleet, returned to Spain. Sent by Charles V on a voyage to discover a western passage to the Moluccas in 1524–25, he sailed along the coast of North America, between lat. 40° N. and Newfoundland. It is not known whether he sailed from north to south, or vice versa. The results of his voyage were incorporated in the map of Diego Ribeiro (1529), where the eastern portion of the United States is called *Tierra de Estevan Gómez.* Consult Harrisse, *Discovery of North America* (London, 1892), and Bourne, *Spain in America* (New York, 1904.)

GÓMEZ, José Miguel (1846–). A Cuban soldier and politician, born in the Province of Santa Clara. The son of a rich cattle raiser, he spent much of his life in this occupation. He served with distinction in the patriot army during the Ten Years' War (1868–78) and again in the revolution of 1905, rising to the rank of major general. During the First American Intervention he was Governor of the Province of Santa Clara and a member of the Constitutional Convention. He was again Governor of Santa Clara under the presidency of Estrada Palma. In 1905 he was the candidate of the Liberal party for the presidency, but withdrew before the election, claiming that the Conservative (administration) party were using corrupt means to secure the victory. His activity in the revolution of 1906 against the régime of Estrada Palma was cut short by his arrest at the beginning of the movement and his imprisonment in Havana, where he remained until the Second American Intervention began. In 1908 he was elected President by the Liberals, and on Jan. 28, 1909, Governor Magoon turned over the government to the new President. Laws were immediately passed legalizing cockfights and the lottery and establishing long-distance telephones. There was much extravagance in the administration of finances during his term. Charges of corruption led in 1912 to a revolt, which was crushed, and a year later President Gómez quietly retired from office.

GÓMEZ, Juan Vicente (1859–). A Venezuelan politician, born in San Antonio de Tachira. He devoted his early life to agricultural pursuits and entered politics in 1892. Having been elected Vice President, he was left in charge of the government by General Castro when the latter went to Europe in 1908. Learning of a plot for his own assassination, Gómez assumed control of affairs and was chosen provisional President. He at once adjusted the difficulties in which Castro's acts had involved Venezuela with various foreign countries. In 1910 he was elected constitutional President for a term of six years. Consult J. Humbert, "Le Président Gómez et la politique Vénézuélienne," in the *Bulletin de la Bibliothèque Américaine* (Paris, 1910).

GÓMEZ DE AVELLANEDA Y ARTEAGA, gō′måth dā ä′vĕl-yȧ-nä′thȧ ė är′tå-ä′gȧ, Gertrudis (1814–73). A Spanish poet, dramatist, and novelist, born on the island of Cuba, where her father, a naval officer, was then serving. In 1840 she went to Madrid and in the same year produced a successful drama, *Leoncia.* She wrote many novels, among which are *Dos mujeres* (1842), *Espatolino* (1844), and *El mulato Sab* (1839), this last-named work being a tale resembling *Uncle Tom's Cabin;* but they are mostly forgotten, and she survives as dramatist and poet. In addition to *Leoncia,* she wrote several other dramas, chief of which are *Saúl* (1849), one of the most daring and happy strokes of genius that Spain has seen, and *Baltasar* (1858), a classic drama with a biblical subject and considered by most critics her masterpiece. Her *Poesías líricas* first appeared in 1841, and critics have been unanimous ever since in proclaiming her without a rival of her sex among writers of Castilian in the nineteenth century. Fitzmaurice-Kelly, who is not fond of superlatives in criticism, goes so far as to say that Doña Gertrudis has no superior (with the single exception of Christina Rossetti) among modern poetesses in any language. A single example will show how her work was judged even when it was not known to be hers. At a literary competition held by the Liceo de Madrid in 1845 two prizes were offered for the two odes that should most worthily praise the Queen's clemency in pardoning a certain political criminal. Doña Gertrudis presented two odes—one signed with her own name and the other with that of her maternal half brother, Felipe de Escalada—and won both prizes. The Liceo then voted her a crown of honor, which was placed upon her head by the Infante Francisco de Borbón. Her *Obras literarias,* vols. i–v (Madrid, 1869–71), are still incomplete.

GÓMEZ-FARÍAS, gō′mås-fä-rē′ås, Valentin (1781–1858). A Mexican statesman. He was born and educated at Guadalajara, where he received a professorship in the university in 1810. He was a pronounced Liberal in the First Constituent Congress, became Vice President upon the election of Santa Anna, and assumed the reins of government upon the absence of the latter (April 1, 1833). In consequence of his pronounced antagonism to the Church party, he was, after a constant struggle of two years against continuous opposition, compelled to resign in 1835 and exiled. Although received by the masses with general acclamation upon his return, his political influence aroused the fears of the party in power, and, after suffering imprisonment and vainly endeavoring to foment a revolution, he was again banished. He was again Vice President at the time of the war with the United States, when Santa Anna was compelled to take the field. After the abolition of the vice-presidential office he became a member of Congress. He later took an active part in overthrowing the dictatorship of Santa Anna and became Postmaster-General under his successor Alvarez.

GÓMEZ Y BÁEZ, gō′mås ė bä′ås, Máximo (1826–1905). A Cuban general, born at Bani, Santo Domingo. He served in the Spanish army in Santo Domingo and in Cuba, but in Cuba he became disgusted with Spanish rule. He left the Spanish army, settled down as a planter, and in the insurrection of 1868–78 joined the insurgents and was made colonel by the Cuban President Céspedes. He was active and able and after Agramonte's death was put in command of the insurgents in Puerto Príncipe. When peace was signed with Campos in 1878, Gómez went to Jamaica and then to Santo Domingo, where he lived on his farm until 1895, when the second revolution broke out. He became general in chief of the forces of the Republic of Cuba and was especially active in Puerto Príncipe, where his perfect familiarity with the country stood him in good stead. He did little open fighting, but accomplished much by harassing the Spaniards and destroying their supplies. He put his small force at the disposal of the Americans as soon as they landed in Cuba and was markedly friendly to this country. In March, 1899, he was deposed from his supreme command by the Cuban Military Assembly for receiving for his army the $3,000,000 voted by the United States government, but his general popularity remained undiminished, and the city of Havana gave him the summer home of the former Spanish Governor-General. Among his sketches of warfare in Cuba are *Panchito Gómez* and *Mi Escolta* (1896). Consult Carrillo, *In the Saddle with Gomez* (New York, 1898).

GOMME, gŏm, SIR (GEORGE) LAURENCE (1853–1916). An English antiquary and folklorist, born in London. He became statistical officer and later clerk to the London County Council, was the founder of the Folklore Society, an organization that has done important work in the preservation of records of the rural customs of England. Of this society he was elected successively secretary, president, and vice president. He was also appointed a lecturer in the London School of Economics and edited the *Archæological Review*, the *Folklore Journal*, and the *Antiquary*. In 1911 he was knighted. His publications include: *Primitive Folk-Moots* (1880); *Folklore Relics of Early Village Life* (1883); *The Village Community* (1890); *Ethnology in Folklore* (1892); *Lectures on the Principles of Local Government* (1897); *Folklore as an Historical Science* (1908); *The Making of London* (1912).

GOMOR′RAH. See SODOM AND GOMORRAH.

GOM′PERS, SAMUEL (1850–). An American labor leader, born in London, England. Apprenticed to the trade of cigar making, he came to the United States in 1863 and in 1864 became the first registered member of the Cigar-Makers' International Union, of which he was secretary and president, and which he made one of the most successful of American trade unions. He was elected vice president of the American Federation of Labor, which he helped to organize in 1881, and from 1882, with the exception of the year 1894, when he was defeated by John McBride, representing the coal miners, was its president. Under his direction the American Federation of Labor grew into a powerful organization, including most of the stronger and more conservative unions of the country. Its influence in politics has been exerted for the most part indirectly, but has counted in such matters as the extension of the eight-hour day to work on government contracts, the short-hour movement in enterprises of a public-service character, employers' liability laws, etc. In 1908 Gompers sought, without marked success, to throw the strength of the Federation to the Democratic party, on the ground that the Republican candidate was unfriendly to organized labor. He consistently opposed socialistic tendencies in the labor movement and actively promoted industrial conciliation. He served as first vice president of the National Civic Federation. In 1907 Gompers and other officers of the American Federation were enjoined by a Federal court from publishing the name of the Buck Stove and Range Company in the list of "unfair" concerns in the organ of the Federation. In consequence of failure to observe the injunction he was tried for contempt and sentenced to a term in prison. Through successive appeals the case was dragged out until 1914, when the Supreme Court decided that further action was barred by the Statute of Limitations.

GOMPERZ, gŏm′pĕrts, THEODOR (1832–1912). An Austrian classical scholar. He was born at Brünn and studied at Brünn and at the University of Vienna, where he was professor of classical philology from 1869 to 1901, when he entered the House of Peers. He is best known for his decipherment of the papyri at Herculaneum (q.v.). He wrote, besides many other works and articles: *Demosthenes der Staatsmann* (1864); *Philodemi de Ira Liber* (1864); *Herculanische Studien* (2 vols., 1865–66); *Beiträge zur Kritik und Erklärung griechischen Schriftsteller* (7 vols., 1875–1900); *Die Bruchstücke der griechischen Tragiker und Cobets neueste kritische Manier* (1878); *Herodoteische Studien* (1883); *Zu Philodems Büchern von der Musik* (1885); *Platonische Aufsätze* (3 vols., 1887–1905); *Griechische Denker, eine Geschichte der antiken Philosophie* (3 vols., 1893–1909; vols. i and ii in a second edition, 1911–12; translated into English by Magnus and Berry, 4 vols., New York, 1905–12). He also edited the German edition of the works of John Stuart Mill (12 vols., 1869–80).

GOMPHOCERAS, gŏm-fŏs′ē-ras (Neo-Lat., from Gk. γόμφος, *gomphos*, nail, bolt + κέρας, *keras*, horn). A genus of tetrabranchiate cephalopods, allied to *Orthoceras*, and found in the Paleozoic rocks, with short, thick, straight, or curved shells, and restricted lobate aperture. The siphuncle is situated near the ventral wall and is usually beaded. The shell, when curved, turns away from the ventral side. *Gomphoceras* presents variations that grade towards *Phragmoceras*, of which it perhaps presents, in a loose sense, an ancestral stage. About 150 species of *Gomphoceras* have been described from rocks of Ordovician and Silurian age of Europe and North America. They are especially abundant in the Silurian basin of Bohemia. See CEPHALOPODA; ORTHOCERAS; NAUTILUS.

GOMPHO′SIS (Neo-Lat., from Gk. γόμφωσις, a nailing together, from γομφοῦν, *gomphoun*, to nail, from γόμφος, *gomphos*, nail, bolt). A joint in which one bone is implanted into a process in another bone, as in the case of the teeth, implanted into the alveolar processes of the jaw.

GOMUTI, gō-mōō′tĭ (Malay), ARENG, or EJOO PALM, also called WINE PALM (*Arenga saccharifera*). An important palm which grows in dry ground in Cochin China and in the interior of Java, Sumatra, Celebes, and Amboyna. The stem is 20 to 40 feet high; the pinnated leaves 15 to 25 feet long. The flowers, which are produced but once, are in bunches 6 to 10 feet long, succeeded by yellowish-brown, three-seeded, extremely acid berries of the size of a small apple. The stem, when young, is entirely covered with sheaths of fallen leaves, and black horschair-like fibres, which issue in great abundance from their margins; but as the tree increases in age, these drop off, leaving a beautiful naked columnar stem. The strongest of the fibres, resembling porcupine quills in thickness, are used by the Malays as styles for writing on the leaves of other palms. The finer fibres, or Ejoo fibre, well known in Eastern commerce as gomuti, are by far the most valuable. They are much used for making strong cordage, particularly for the cables and standing rigging of ships, European as well as native. Want of pliancy renders them less fit for running rigging and for many other purposes. They need no preparation but spinning or twisting. No ropes of vegetable fibre withstand wet as well as those made of gomuti fibre. At the base of the leaves of the gomuti palm there is a fine woolly material, called bara, much employed in calking ships and stuffing cushions. The saccharine sap, obtained in great abundance by cutting the spadices of the flowers, is evaporated to make a brown sugar, the so-called jaggery. It is also a beverage and by fermentation yields an intoxicating wine (neroo), from which a spirituous liquor called brum is made. According to Roxburgh, the pith of the tree yields sago, as much as 150 pounds being taken from a single specimen. After fruiting, the tree dies, and the stems, which become hollow, are used for troughs, spouts, etc. The young fruits are employed for making preserves.

GONAÏVES, gō̇′nȧ′ē̇v′. A seaport town of Haiti, with an excellent harbor, situated on the west coast, about 67 miles northwest of Port-au-Prince (Map: West Indies, D 3). It is a prosperous place, with a large trade in cotton, coffee, and logwood. It has played a prominent part in the history of Haiti; Dessalines proclaimed the independence of the country here (Jan. 1, 1804). In 1914 two important battles were fought here between the rebels and the government forces. Its population is estimated at 13,000. Gonaïves is the seat of a United States consul.

GONAQUAS, gō̇-nä′kwȧz. A mixed Hottentot-Kaffir people of Cape Colony. See Griquas.

GONÇALVES DIAS, gō̇ɴ-säl′vĕsh dē′ȧsh, Antonio (1823–64). A Brazilian poet, born in Maranhão. He was educated at the University of Coimbra, Portugal, but, returning to Brazil in 1846, there published his first volume of poems, *Primeiros cantos,* which won him immediate fame. Two years later his *Segundos cantos* appeared. In 1849 he was chosen to fill the newly created chair of Brazilian history in the Imperial College of Pedro II. The publication in 1851 of his *Ultimos cantos* practically closed his poetical activity, for in that year he was appointed to investigate educational conditions in northern Brazil. In 1852 he was sent to Portugal to collect from the archives there documents relating to Brazilian history, and in 1860 he was a member of a scientific expedition to Ceará to report on history and ethnography. His last years were spent in Europe in declining health, and he died at sea during a storm which sank the ship and with it his remains and the results of his last three years' labors. Possessing the blood of the three races of Brazil, he represents that which is most national in her poetry, besides being the bard of the Indians. His writings include history, drama, and lyric poetry, in the latter of which he ranks first in Brazil. Besides his *Cantos,* his writings include the epic *Os Tymbiras* (1857), *Diccionario da lingua Tupy* (1858), *Historia dos Jesuitas de America* (incomplete), and numerous reports on his special commissions. Consult his *Obras posthumas . . . precedida de uma noticia de sua vida e obras pelo Dr. A. Henriques Leal* (Maranhão, 1868), and Verissimo, *Estudos de literatura brazileira, segunda serie* (Rio de Janeiro, 1901).

GONCHAROV, gŏn′chȧ-rôf′, Ivan Alexandrovitch (1812–91). A great Russian novelist. He was born at Simbirsk, of a very wealthy family. At 10 he was sent to school at Moscow, whence he went to visit his home only during vacations. Completing his university course in 1836, he accepted a position in the Ministry of Finance. His literary career began with *A Common Story* (1847), which had a great success. In 1856–57 he published the *Frigate Pallas,* a collection of letters describing his voyage around the world, made in the frigate *Pallada.* These letters constitute one of the choicest works of the kind in Russian literature. In 1858 he wrote the novel *Oblomov* and a little later was appointed to a position in the Department of Censorship. Then he became editor of the official organ, the *Northern Post,* and retired with a pension in 1873. In 1868 his *Precipice* appeared in the *Messenger of Europe* and greatly aroused the public and critics by the caricature of Young Russia in the dissolute Volokhov. His later short sketches and critical essays, the most striking of which is *A Million Tortures*—a powerful analysis of *The Woes of Wit* by Griboedov (q.v.)—added little to the fame of the author of *Oblomov,* a masterpiece which ranks with the best novels of Tolstoy and Turgenev (qq.v.). The diseased will and chronic indolence which its hero, Oblomov, typifies have given Russia the term "Oblomovism." The power of generalization reached here by the author has never been surpassed in Russian literature. The best complete edition of his works was published at St. Petersburg in 1886–87. Consult: Merezhkovsky, *Dostoyevsky, Goncharov, Maikov* (St. Petersburg, 1908); Vengerov, *Druzhinik, Goncharov, Pisemsky* (ib., 1911); Liatsky, *Goncharov: His Life, Personality, and Work* (ib., 1912). In English a good brief study may be found in Kropotkin's *Russian Literature* (New York, 1905).

GONCOURT, gôɴ′ko͞or′, Edmond de (1822–96) and Jules de (1830–70). Brothers, important in the development of French fiction. They fostered naturalism by the minuteness of their observation and so continued the naturalistic method of Flaubert and regarded themselves as masters of a school in which Zola was the most brilliant pupil; while, on the other hand, in the tortured artificiality of their style they presage the painful striving of the Symbolists (q.v.) to express feeling and emotion by sound. Their intensely modern style, often bizarre, sometimes intentionally faulty, always achieving its effect, made all their contemporary novelists in some degree their debtors, while it estranged the general public. Their work consists of unimportant dramas, of minute and valuable studies in the social life of the French eighteenth century: *Histoire de la société française pendant la révolution* (1854); *Histoire de la société française pendant le directoire* (1855); *La révolution dans les mœurs* (1854); *Portraits intimes du XVIIIème siècle* (1856–58); *Marie Antoinette* (1858); *Les maîtresses de Louis XV* (1860–79); *La femme au XVIIIème siècle* (1862); *L'Art au XVIIIème siècle* (1874); *L'Amour au XVIIIème*

siècle (1877); to which Edmond added historical studies of *Watteau* (1876), *Prud'hon* (1877), and *Les actrices au XVIIIème siècle* (1855–90); of articles that first directed French attention to Japanese art; and, finally, of novels: *Charles Demailly* (1860); *Sœur Philomène* (1861); *Renée Mauperin* (1864); *Germinie Lacerteux* (1865); *Manette Salomon* (1867); *Madame Gervaisais* (1869); to which Edmond added: *La fille Elisa* (1878); *Les frères Zemganno* (1879); *La Faustin* (1882); *Chérie* (1884). All these are minutely realistic, composed of facts and observations strung together without much regard for unity of composition. Their observation, however, for all its minuteness is apt to be superficial and morbid. *Germinie Lacerteux* is to be "the clinic of love," and *La fille Elisa* pushes to its utmost paradox the divorce between fiction and conventionality, though in *Renée Mauperin* they succeeded in giving a most characteristic portrayal of the young Parisian society girl. Their ability to reproduce a series of sensations by a series of images is what most attracts. Edmond left the larger part of his fortune to endow an Academy of the Goncourts. This was first organized in 1904 with 10 members, each to receive an annual income of 6000 francs. Every year a prize of 10,000 francs is awarded to the author of a meritorious work in prose. Among the members named by Goncourt in his will were Alphonse Daudet, Léon Hennique, J. K. Huysmans, Paul Margueritte, and the Rosny brothers. Their *Journal* (1887–96) is a most valuable document on the literary movement of their period. Consult: Delzant, *Les Goncourts* (Paris, 1889); Brunetière, *Le roman naturaliste* (ib., 1896); Wells, *A Century of French Fiction* (New York, 1898); Gustave Abel, "Le labeur des de Goncourt," in *Mélanges de Philologie* (Paris, 1901); M. Fuchs, *Lexique du Journal des de Goncourt* (ib., 1912).

GON′DAR, or Guendar. The former capital of Abyssinia, in Amhara, situated about 25 miles north of Lake Tsana (Map: Egypt, D 5). It lies on an isolated hill in a spur of the Wogara Mountains, at an altitude of over 6000 feet. It is poorly built, with crooked, narrow streets, and is divided into several parts, which are located at some distance from each other. In former times Gondar had a large number of churches, of which only one is now in perfect preservation. Near by is the ruined fort of Gip, constructed by the Portuguese. The palace is a fine example of Abyssinian architecture. The inhabitants, once estimated at 50,000, now number about 7000, including many monks and other ecclesiastics. Gondar is on the route of the partly constructed railway line from Massawa (q.v.). There are many skilled artisans here, who produce gold ornaments and textiles. Gondar is the seat of the abuna, the head of the Abyssinian church, and has several ecclesiastical schools. Its decline dates from the reign of Theodore II, whose hostile attitude towards the Mohammedans caused a great decrease in the population. Of late years Gondar has shown signs of returning prosperity, and the Mohammedan population is rapidly on the increase. Consult P. H. G. Powell-Cotton, *A Sporting Trip through Abyssinia* (London, 1902).

GONDI, or **GONDY,** gôɴ′dê′, Jean François Paul de. See Retz.

GON′DIBERT. A religious epic in elegiac stanzas by Sir William Davenant, begun late in 1649, in Paris, and finished during imprisonment in the London Tower. It was published in 1651.

GONDOKORO, gȯn-dȯk′ô-rȯ, or **ISMAILIA,** ēz′mȧ-ē′lē-ȧ. A small settlement in Uganda, capital of the northern province of that protectorate, 1070 miles south of Khartum, situated on the upper Nile, in lat. 4° 55′ N. (Map: Egypt, C 6). It was formerly an important trading centre for ivory and slaves. Its commerce began to decline after its annexation to Egypt in 1871, though it is still important commercially as the head of the navigation of the Nile and is the outlet for much of the produce of northern Uganda. It is also a military post of some distinction. Gondokoro figures prominently in the history of the explorations of Africa.

GON′DOLA (It.). The ordinary passenger boat used in the canals of Venice. Gondolas were formerly the only means of getting about the city, but they are now being displaced in part by small launches. An ordinary gondola is 30 feet long and 4 or 5 feet wide and is flat-bottomed, so that the draft is light. The bottom rises slightly above water at the ends, while at the bow and stern slender ornamental stem and stern pieces reach to about the height of a man's breast. The stem piece is surmounted by the *ferro,* a bright iron beak of uniform shape, the *rostrisque tridentibus* of Vergil, common to old Roman galleys. There is a covered shelter for passengers in the middle of the boat, which is easily removable. In accordance with a mediæval regulation, gondolas are painted black. The gondolier stands erect, with his face towards the bow, and propels the boat with a forward stroke, making his way through the narrow and often crowded canals with amazing dexterity.

GONDS. An important Dravidian people, inhabiting mainly the Central Provinces of India, but found also in other sections of the country, and numbering about 1,500,000. The wilder and uncivilized tribes of the Gonds, who inhabit the forested hills of the Vindhya and Satpura ranges, preserve more of the primitive Dravidian physical type, social institutions, religious and mythological beliefs and practices than do those whose culture is more advanced, who have to a considerable extent adopted Hinduism, and with whom the higher classes are more or less mixed with Hindu blood. The Gonds are said to have formerly offered up human sacrifices to some of their deities, but now they sacrifice instead an image of straw. The Gond women have a curious festival, called the Gurturna (sugar breaking), in which the men figure to some disadvantage. It often ends in a saturnalia. Among the Gonds the worship of such plagues as smallpox, cholera, etc., prevails, and many of them reverence the dog, the horse, and the tiger to an extraordinary degree. The Gonds are to a large extent monogamous and have many curious marriage and premarital customs. The Gonds are not to be confounded with the Khonds, another Dravidian people to the east of them. Besides the earlier works of Campbell, *Wild Tribes of Khondistan* (London, 1863), and Hislop, *Aboriginal Tribes of the Central Provinces* (Nagpur, 1866), reference may be made to Forsyth, *Highlands of Central India* (3d ed., London, 1889); V. A. Smith, *The Early History of India* (ib., 1908); T. W. Holderness, *Peoples and Problems of India* (New York, 1912).

GONDWANA, gŭnd-wȧ′nȧ (the land of the

Gonds) (q.v.). A name vaguely applied to a hilly tract in Central India, lying between lat. 18° and 24° 30′ N. Most of the region is included in the Central Provinces.

GON′ERIL. The more wolfish of the unnatural daughters of King Lear, in Shakespeare's tragedy of that name.

GON′FALON (archaic *gonfanon*, OF. *gonfanon*, Fr. *gonfalon*, from ML. *gonfano*, *guntfano*, banner, from OHG. *gundfano*, battle flag, from *gund*, battle + *fano*, *vano*, Ger. *Fahne*, flag). The ensign or standard, indicative of authority, which was carried before, and sometimes by, the chief magistrate (hence called gonfaloniere) of many of the Italian cities in the latter part of the Middle Ages. The title was also used by the counts of Vexin, and when Vexin passed to the crown the French King became the "Gonfalonier de S. Denis."

GONG. See Tam-Tam.

GÓNGORA Y ARGOTE, gōn′gȯ-rȧ ḗ är-gō′tȧ, Luis de (1561–1627). A Spanish poet, born at Cordova. He studied law at the University of Salamanca and there composed the greater part of his erotic poems, romances, and satires. At the age of 45 he took orders, obtained a small prebend in the cathedral of Cordova, and was afterward appointed honorary chaplain to Philip III. Góngora's poetic career divides itself into two periods. In his first or youthful period he yielded himself up entirely to the natural tendencies of his genius and to the spirit of the nation. His lyrics of this period are *villancicos*, *letrillas*, romances, and sonnets in the old genuine Spanish style, and, as regards their caustic satire and burlesque wit, are among the most admirable specimens of the class of poems to which they belong. Góngora, however, wished to outdo all his predecessors and to furnish something wholly new and unheard of; and the result of this unfortunate ambition was the introduction of a new poetic phraseology, called the *estilo culto*, or the 'cultivated style.' From this point the second period in Góngora's literary career dates. To popularize the *estilo culto*, he wrote his *Polifemo*, *Soledades*, and the *Piramo y Tisbe*—productions of the most pedantic and tasteless description, poor in invention and thought, but rich in high-sounding, pompous phrases, and overloaded with absurd imagery and mythological allusions, expressed in language of studied obscurity. In this way he became the founder of a new school, the *Gongoristas*, or *Culteranos*, who even surpassed their master in the depravity of their literary tastes. The baneful influence of Góngorism, a style quite like that of Euphuism in England and that of Marinism in Italy and France, continued down through the eighteenth century. None of Góngora's poems were printed during his lifetime; but in 1627, immediately after his death, they were published at Madrid by his friend Vicuña, as the *Obras en verso del Homero Español*. Some additions are found in the later editions of 1633, 1654, and 1659, as well as in the edition of 1636–49, for which Salcedo Coronel prepared a commentary, made necessary by the studied obscurity of Góngora's style. He died at Cordova. A critical edition of the poet's work is still a desideratum.

Bibliography. Quintana, *Poesías selectas*, vol. iii (Madrid, 1807); Churton, *Góngora: An Historical and Critical Essay, with Translations* (London, 1862); *Poesías escogidas de Góngora, con varias inéditas* (Madrid, 1863); *Revue Hispanique*, vol. iv (Paris, 1897), containing 49 unedited poems published by Rennert; Foulché-Delbosc, "Note sur trois manuscrits des œuvres poétiques de Góngora," in *Revue Hispanique*, vol. vii (1900), "Vingt-six lettres de Góngora," ib., vol. x (1903), "Poésies attribuées à Góngora," ib., vol. xiv (1906), "Bibliografie de Góngora," ib., vol. xviii (1908); Thomas, *Góngora et le gongorisme considérés dans leur rapports avec le marinisme* (Paris, 1911); *Biblioteca de autores españoles*, vol. xxxii (Madrid, 1849–80), unsatisfactory as to text.

GONIATITES, gō′nĭ-ȧ-tī′tēz (Neo-Lat., for **Gonialites*, from Gk. *γωνία*, *gōnia*, angle + *λίθος*, *lithos*, stone, in allusion to the angulate sutures). An extinct tetrabranchiate cephalopod, the shell of which resembles that of the Ammonoidea in form, but differs from it in having a simple suture line that shows undulating or zigzag curves without secondary crimping. The Goniatites have smooth unornamented shells of discoid or globular form, with open or closed umbilicus. They vary in size from 1 to 4 inches, though some species from the Devonian system attain a diameter of over 12 inches. The name "Goniatites" has long been used in a generic sense; but the group has proved to be heterogeneous, and the species have been redistributed among a number of new genera and four new suborders, the Microcampyli, Mesocampyli, Eurycampyli, and Glossocampyli, these names referring to the form of the saddles of the sutures in the types of the different groups. The old genus *Goniatites* was considered to be an intermediate form between the Nautiloidea and the Ammonoidea, and the above-mentioned suborders represent, in a broad way, transition groups between certain races of nautiloids and certain races of ammonoids.

The species of *Goniatites* appear first in the lowest Devonian rocks, and they disappear in the Triassic system; their period of maximum development was during Upper Devonian and Lower Carboniferous time. They are thus index fossils of the Upper Paleozoic age. They are found in Europe, Asia, Australia, and North America, often in such abundance that the beds containing them have received the names of Clymerien-kalk and Goniatites limestone. See Ammonoidea and Cephalopoda, and the bibliography given under the latter title.

GONID′IA (Neo-Lat. nom. pl., from Gk. *γονή*, *gonē*, seed). The algal cells of a lichen. Also applied by some botanists to the asexual spores of algæ and fungi and including the well-known conidia of those groups. See Lichen.

GONIOCERAS, gō′nĭ-ŏs′ẽr-ăs. A widely aberrant genus of nautiloid cephalopods, characterized by its flat triangular shape, with broad lateral wings, recurving septa, and moniliform siphuncle. It is best known by *Gonioceras anceps* from the Ordovician limestones of New York and Canada, but has been found in the far north of America and in China, apparently having been restricted to the Pacific and Arctic oceans and their continental invasions. See Cephalopoda; Nautilus.

GO′NIOM′ETER (from Gk. *γωνία*, *gōnia*, angle + *μέτρον*, *metron*, measure). In mineralogy, an instrument used to measure the angles of crystals. The simplest form is the contact goniometer, which consists of a pair of arms which move about a pivot like a pair of shears and can be clamped in any position and connected with a protractor for the reading of angles. The *reflecting goniometer* makes use of a beam of light reflected successively into a telescope from different faces of a crystal as the crystal is revolved upon a single axis. The direct readings of this instrument give by their numerical difference the supplement of the angle desired. The most modern type of goniometer is constructed on the principle of the theodolite and measures angles in two planes at right angles to each other. This is known as the *theodolite goniometer*, or *two-circle goniometer*, and its introduction has not only extended the possibilities of measurement, but greatly simplified the calculation of crystal forms. See CRYSTALLOGRAPHY.

GO′NIOM′ETRY. A branch of trigonometry concerned with the functions of angles in general and with their relations. The word signifies "angle measure." See TRIGONOMETRY; GONIOMETER.

GÖNNER, gĕn′nẽr, NIKOLAUS THADDÄUS VON (1764–1827). A German jurist, statesman, and author. He was born at Bamberg, where he was appointed to the chair of law (1789). Ten years afterward he accepted a similar position at Ingolstadt, where he exercised a most beneficial influence upon the development of the university, which by his suggestion was subsequently removed to Landshut. From 1811 until shortly before his death he held many judiciary offices at Munich, where he was appointed Councilor of State in 1820. His principal works include *Handbuch des deutschen gemeinen Prozesses* (2d ed., 4 vols., 1804) and *Deutsches Staatsrecht* (1804).

GO′NOCOC′CUS. See GONORRHŒA.

GONORRHŒA, gŏn′*o*-rē′ȧ (Lat., from Gk. *γονόρροια*, *gonorrhoia*, from *γόνος*, *gonos*, semen + *ῥοιά*, *rhoia*, a flow, from *ῥεῖν*, *rhein*, to flow). A name which was formerly applied almost indiscriminately to all discharges from the genital passages in both sexes. At present the name designates a specific inflammatory disease of the mucous membrane of the urethra, caused by a germ, the gonococcus, which was discovered by Neisser. The disease is never caused by "taking cold," or a "strain," by mere uncleanliness or injury. The access to the urethra of mucus or pus containing the gonococcus occurs, in the vast majority of cases, during sexual intercourse. From 2 to 10 days after the sexual intercourse a slight watery discharge appears at the mouth of the urethra, the lips of which become red and swollen. The discharge quickly becomes abundant and white, later yellowish, possibly greenish or bloody. Itching follows, with burning pain, especially on urination, which becomes frequent. In the male painful erections of the penis occur, principally at night, during which the organ is curved. This condition is called *chordee*. Disease of deeper parts often follows an acute attack, and the prostate gland, seminal vesicles, and neighboring lymphatics become infected. General infection is frequently followed by "gonorrhœal rheumatism," which is an arthritis, or joint disease, with stiffness and pain, caused by the toxins which are formed by the disease germs. It is extremely difficult to treat the disease when it invades the prostate gland or the seminal vesicles. In a woman the vagina, bladder, uterus, Fallopian tubes, and ovaries may be attacked. In many cases acute symptoms are absent or slight, and the patient may not know she has the disease till uterus and tubes are attacked.

From three to five days after contracting the disease most patients suffer from fever, headache, slight nausea, possibly preceded by a chill. During this stage the patient should be in bed, on low diet, and should take a cathartic and drink large quantities of plain water. Injections taken too early or in too concentrated a form may drive the infected mucus deeper, or injure the urethra. Injections of solutions of protargol, argyrol, nitrate of silver, permanganate of potash, sulphate of zinc, etc., are prescribed. Irrigations with bichloride of mercury are sometimes used. Internally cubebs, copaiba, salol, oil of sandal, saw palmetto, and many other drugs are given. When the infection is deep-seated or when the joints are involved, vaccines are frequently curative. All alcoholic beverages must be absolutely prohibited, and all sexual intercourse positively stopped, till two weeks after the patient is cured. The disease is not at an end when the discharge stops, unless the urine is perfectly clear, and the mucus from the prostate gland as well as the seminal fluid contains no gonococci discoverable by the microscope. Infection of a wife may occur when there is no discharge from the disease if the germs lurk in the seminal vesicles. Extreme care should be taken by one suffering with gonorrhœa to catch the discharge in gauze, which should be burned. If the fingers be soiled with the discharge, the eyes may become infected, and blindness may result. The testicles should be supported by a snug suspensory bandage. Patent medicines should be shunned. If gonorrhœa persists for a considerable time and the discharge becomes thin and scanty, the term "gleet" is applied to it.

The *Gonococcus*, or *Micrococcus gonorrhœæ* is an extremely minute organism. It occurs in pairs, with flattened sides lying in apposition. For this reason it is often referred to as the *Diplococcus gonorrhœæ*. It grows readily on human blood serum, with or without agar, at the temperature of the body, not on the more common media. The mucous membranes of the lower animals do not seem susceptible to gonorrhœal infection, but the human urethra reacts promptly to inoculation with pure cultures. In the mucous membrane it sets up an exudative inflammation and may be found either free in the exudate or inclosed in the cast-off epithelial cells. Its presence within the cell bodies, taken in connection with its occurrence in pairs, and its behavior when subjected to a special stain known as Gram's stain, complete its indentification. Quite frequently the pus-producing organisms are associated with the gonococcus. It is believed that gonorrhœal infection from the vagina of the mother during parturition is responsible for *ophthalmia neonatorum*, a severe form of conjunctivitis which often results in blindness through the destruction of one or both eyes.

GONORRHŒAL OPHTHAL′MIA. See CONJUNCTIVITIS.

GONSALVO DE CÓRDOBA, gȯn-säl′vȯ dȧ kôr′dȯ-bȧ (GONZALO HERNÁNDEZ Y AGUILAR). A celebrated Spanish commander. He was born at Montilla, near Cordova, in 1453 (according to some in 1443). He distinguished himself in the war waged by Queen Isabella of Castile against Portugal and in the war against the Moors and was charged in 1491 with the conduct of the negotiations for the surrender of

Granada. In 1495 he was sent by Ferdinand of Aragon to the assistance of Ferdinand, King of Naples, against the French. In less than a year Gonsalvo, with his limited resources, had delivered the greater part of the kingdom and obtained the appellation of *El Gran Capitán.* In 1498 he returned to Spain and was received with signal marks of distinction by the King. Having been placed in command of a fleet in the Mediterranean, he took Cephalonia from the Turks at the beginning of 1501 and restored it to Venice. When the partition of the Kingdom of Naples was determined upon by a compact between Louis XII of France and Ferdinand the Catholic, entered into at Granada in 1500, Gonsalvo de Córdoba led the invading Spanish army. The conquest of the kingdom was speedily achieved, but the conquerors soon quarreled over the partition of the booty, and war broke out between them in 1502. Gonsalvo de Córdoba vanquished the French at Cerignola, April 28, 1503, took possession of Calabria, the Abruzzi, Apulia, and the city of Naples itself, and then laid siege to Gaeta, but was compelled to retreat before a superior force of the enemy. On December 27 of the same year, however, he fell upon them unexpectedly near the Garigliano and obtained a complete victory. The French army was almost annihilated, the fortress of Gaeta fell, and the possession of Naples was secured to the Spaniards. King Ferdinand bestowed the Duchy of Sesa upon the conqueror and appointed him Viceroy of Naples with unlimited authority. His good fortune, however, made him many powerful enemies, and his popularity with the Neapolitans awoke the King's jealousy. Gonsalvo was recalled to Spain, where the King treated him with marked neglect. He now betook himself to his estates in Granada; but after the defeat of the new Viceroy in Naples by Gaston de Foix, he was again appointed to the command of the Spanish army in Italy. Mental suffering, however, had undermined his health, and on Dec. 2, 1515, he died at Granada. Consult Quintana, *Vida de españoles célebres* (Madrid, 1807), and Prescott, *Ferdinand and Isabella* (Philadelphia, 1864).

GONTARD, gōn′tärt, Karl von (1731–91). A German architect, born at Mannheim. He studied under Richter at Bayreuth and François Blondel at Paris. In 1765 he entered the service of Frederick the Great, with whom he became a favorite, and who intrusted him with several architectural commissions. His structures include two tower-like domes erected on previously existing churches on the Gendarmenmarkt, Berlin; the colonnades of several fine bridges at Berlin; and the marble palace at Potsdam, completed by Langhans.

GONTAULT, gôɴ′tȯ′, Charles de. See Biron, Charles de Gontault, Duc de.

GONTAUT-BIRON, gôɴ′tō′-bē′rôɴ′, A. L. de. See Lauzon, Duc de.

GON′VILLE AND CAIUS (kēz) **COLLEGE.** A college of Cambridge University, which is usually called Caius College. It was founded in 1348 by Edmund Gonville, sometime vicar-general of the diocese of Ely; but the sudden death of the founder and the insufficient provision for support of the scholars led Gonville's executor, William Bateman, Bishop of Norwich, to remodel the statutes, rechristen the house as the College of the Annunciation, and divert the students to the special study of theology and canon and civil law. Soon after, the college was moved from its original site to the place it now occupies. It was then of little importance and seems to have consisted only of a master and three or four fellows. In 1558 Dr. John Caius, who was physician to the court, refounded the college, altering the name to its present form; added much to the college buildings as well as to the endowment; and became master of the college, which office he held till his death in 1573. Owing to his influence, the college has since been famous for its attention to medical studies, and some of the greatest of English physicians have been among its members, of whom Harvey, the discoverer of the method of the circulation of the blood, is the most distinguished. Gonville and Caius College consists of a master and 29 fellows. It has 36 scholarships and exhibitions, besides several studentships in medicine and natural science. Among its great names are those of Sir Thomas Gresham, Jan Gruter, Jeremy Taylor, and Lord Chancellor Thurlow. Consult J. Venn, *Caius College* (London, 1901).

GONZAGA, gȯn-zä′gȧ, House of. A princely Italian family whose members for a number of centuries ruled over Mantua and Montferrat. It claimed descent from the German Emperor Lothair. The rule of the Gonzaga in Mantua was established in 1328 by the final defeat of the Bonacolsi family and the murder of their chief, Passerino de' Bonacolsi, by his brother-in-law Luigi I. In 1432 the captaincy was changed to a marquisate and in 1530 to a dukedom. In 1536 the Gonzaga became marquises of Montferrat, in 1539 they acquired the Duchy of Guastalla, and in 1565 that of Nevers. Other important possessions of the family at various times were the duchies of Solferino, Rethel, and Sabbionetta, the Principality of Bozzolo, the Marquisate of Medola, the countships of Torelli and Novellara, and the Principality of Castiglione. The members of the house of Gonzaga were the faithful champions of Imperial interests in Italy and waged war with the Visconti, dukes of Milan. They produced many men who became famous soldiers, statesmen, churchmen, and patrons of art and letters. The most illustrious of these were: Giovanni Francesco (died 1444), in whose favor Mantua was created a marquisate by the Emperor Sigismund, in return for services to the Empire.—Giovanni Francesco II (reigned 1484–1519), who was defeated by Charles VIII of France at the battle of Fornovo, on the banks of the Taro, in 1495, and who took part in the engagement of Atella (1496), which led to the capitulation of the French forces in Naples. His son, Federigo II (reigned 1519–40), was invested by the Emperor Charles V with the ducal dignity in 1530 and also obtained the Marquisate of Montferrat in 1536. During the reign of this prince the court of Mantua was one of the most magnificent in Europe.—Guglielmo (1550–87), son of Federigo, proved a wise and enlightened ruler; his secretary was Bernardo Tasso, father of the poet.—Vicenzo (1587–1612), son of Guglielmo, was the warm friend and patron of Tasso. His brother Luigi (1568–91) was a Jesuit scholastic, and died while attending those stricken of the plague in Rome. He was canonized as St. Aloysius in 1726 and is the patron saint of students. Vicenzo was followed by his three sons, Francesco, Ferdinand, and Vicenzo, all of whom died without heirs, and thus the direct line of the ducal branch became extinct in 1627. A collateral branch in the person of Charles I, Duke of Nevers, son of Ludovico, the brother of Guglielmo, mentioned above, claimed the duchy, which was contested by his cousin, Cesare, Duke of Guastalla. This family feud led to a war, in which France supported Nevers, while the Emperor Ferdinand II claimed the right of adjudging Mantua, as an Imperial fief, to a candidate of his choice. Spain supported Austria in this War of the Mantuan Succession. Mantua was stormed, sacked, and stripped of all its treasures by the Imperialists in 1630 and never regained its former splendor. The war was terminated a few months later, Charles de Nevers being recognized by the Emperor. The successors of Charles were weak and dissipated rulers, and the tenth and last Duke of Mantua, Charles IV, was the worst of all. As he had allied himself with the French in the War of the Spanish Succession, the Emperor Joseph I placed him under the ban of the Empire, and he was deprived of his possessions, the Duke of Savoy seizing Montferrat, and Austria taking Mantua and the minor fiefs. This division was confirmed by the treaty of peace that followed. Charles died in exile in 1708, leaving no issue, and the family became extinct, save for the branch which ruled Guastalla until 1746. Consult: Symonds, *The Renaissance in Italy* (7 vols., London, 1897–98); E. Solari, *Ercole Gonzaga* (Venice, 1904); C. Hare, *A Princess of the Reformation: Giulia Gonzaga, her Family and Friends* (New York, 1912).

GONZAGA, gȯ̆n-zä′gȧ, Thomaz Antonio (1744–1807). A Portuguese poet, born at Oporto. He studied law in the University of Coimbra, receiving his degree in 1763. In 1768 he went to Brazil, and, after having acted for some years as local magistrate at Beja and elsewhere, he was appointed judge at Villa Rica in the Province of Minas. Before this time he developed some talent for versification, and his literary tastes soon brought him into intimate association with Claudio Manoel da Costa, Alvarengo Peixoto, and other writers of the so-called Minas school; but the love which inspires the poet did not come upon him until he had made the acquaintance (c.1788) of Doña Maria Joaquina Dorothéa de Seixas, the Marilia of his masterpiece, the *Marilia de Dirceu* (the latter being the name adopted by the poet himself). These verses form the most remarkable collection of erotic poetry, dedicated to a single person, ever written in Portuguese. Gonzaga had just been nominated a member of the Supreme Court of Bahía and was on the eve of his marriage when discovery was made of the treasonable plot of Minas, and he was arrested on suspicion of having been implicated in it. On inconclusive circumstantial evidence he was condemned (1792) to banishment for life to Pedras de Angoche, a sentence which was afterward commuted to one of 10 years' exile at Mozambique. Here he made some effort to practice as an advocate, but he never recovered from the depression with which his cruel lot had affected him. He was attacked by nervous fever, which undermined his health, and after years of increasing melancholy, which occasionally alternated with fits of acute mania, he died. His poems are still favorites with the Portuguese-speaking peoples, chiefly because of the charm of their style, their melody, and their refined sentiment. Some 29 editions of the *Marilia de Dirceu* appeared before 1854. The best edition is that published in 1862 at Paris. There are biographies prefixed to the editions of Rio de Janeiro (1845 and 1862).

GONZALES, gŏn-zä′lĕz. A city and county seat of Gonzales Co., Tex., 76 miles east of San Antonio, on the Galveston, Harrisburg, and San Antonio, and the San Antonio and Aransas Pass railroads, and on the Guadalupe River (Map: Texas, D 5). Cotton, cottonseed oil, brick, and tiles are produced. Gonzales was the scene of the first battle in the struggle for Texan independence from Mexico (see Texas). Pop., 1910, 3139.

GONZALEZ, gȯ̆n-sä′lĕs, Manuel (1833–93). President of Mexico from 1880 to 1884, born near Matamoros, Tamaulipas, Mexico. He attained prominence as reactionary leader under Marcelino Cobos. In the succeeding civil wars he received a wound in action which resulted in the loss of an arm. Under Juárez he fought brilliantly during the French invasion, was promoted brigadier general for bravery in 1867, and after the fall of the city of Mexico was appointed by Juárez governor of the government palace. In 1871 he was arrested on a charge of complicity in the stealing of the gold and silver plate that had belonged to Maximilian, but in the revolution of the same year escaped and joined Díaz. He took part in the third rebellion of Díaz in 1876, distinguished himself in the decisive battle of Tecoac, and in 1878 was appointed by Díaz Secretary of War. In 1880 he resigned his portfolio to become a candidate for the presidency, to which office he was elected. His administration was marked by financial mismanagement and disaster. His attempt to compromise the English debt, and his decree suppressing the liberty of the press, aroused such opposition that he resigned in 1884, in favor of Díaz. A resolution of impeachment for misappropriation of funds was introduced in the national Congress, but was not pressed, and he afterward successfully administered the affairs of the State of Guanajuato, of which Díaz appointed him Governor.

GONZÁLEZ CARVAJAL, gȯ̆n-thä′lȧth kär′vȧ-äl′, or **CARBAJAL,** kär′ʙȧ-ʜäl′, Tomás José (1753–1834). A Spanish poet and statesman. He was educated in Seville, where he studied theology and jurisprudence and became a noted Hellenist and Latinist. After holding, in the Treasury Department and elsewhere, a number of offices of importance, and refusing to swear allegiance to Joseph Bonaparte as King of Spain, he was obliged to flee in disguise from Madrid to Seville in January, 1809. In March, 1813, he was made Secretary of State and Secretary of the Treasury Department, but resigned both positions in August of the same year in order to become director of the Estudios Reales de San Isidro, where, by establishing a chair of international law and by his liberal ideas, he offended the government and was imprisoned for five years. He was reinstated by the revolution of 1820 and became Councilor of State, but was forced into exile by the counterrevolution three years later. After 1829 he became successively Minister of the Supreme Council of War, member of the Royal Council of Spain and the Indies, and Knight Grand Cross of the Order of Isabella the Catholic. Carvajal was the author of metrical translations of the poetical books of the Bible and of other works in prose and verse, which earned for him membership in the Real Academia Española and in the Real Academia de la Historia; and his name figures in the *Catálogo de autoridades de la lengua* published by the Spanish Academy.

GONZÁLEZ DÁVILA, dä′vē-lä, or **DE ÁVILA,** Gil (c.1578–1658). A Spanish historiographer, born at Avila. He held a minor ecclesiastical office at Salamanca and was appointed royal chronicler of Castile (1612) and the Indies (1641). His *Teatro eclesiástico de la primitiva iglesia de las Indias Occidentales* (1645–55) holds a high place as a general Church history of New Spain. The same may be said, for Spain, of his *Teatro eclesiástico de las ciudades é iglesias catedrales de España* (Salamanca, 1618) and of his *Teatro eclesiástico de las iglesias de España* (2 vols., Madrid, 1649–56).

GONZÁLEZ NAVE′RO, Emiliano (1861–). A Paraguayan politician. He was educated at the University of Asunción. In 1887 he was appointed criminal judge and later a member of the Superior Court. Entering politics, he was elected senator by the Liberal party. In 1905 he was made Minister of Finance in the cabinet of President Ferreira. The next year he was chosen Vice President and in 1908 succeeded to the presidency. He called the most distinguished men of the country to his aid and endeavored to foster better relations with the rest of Latin America.

GONZALO DE BERCEO, gōn-thä′lō dȧ bâr-thā′ō (?1180–?1247). The earliest Castilian poet whose name we know with certainty. Born at Berceo (Old Castile), he became a secular priest in the Benedictine monastery of San Millán de la Cogolla. He became deacon in 1221 and priest in 1237. He appears as a witness in an Act of 1246, which is the last certain date we possess for his life. In addition to the 13,000 verses (written in the four-verse couplets known as the *cuaderna vía*) which compose the nine long works that are known to be his, the 10,000 verses of the *Libro de Alejandre* have also been attributed to him; but not all scholars are convinced of the justification for this latter claim. In 1736 appeared the first edition of any of his works, *La Vida de Santo Domingo*, published by Vergara; and in 1780 Tomás Antonio Sánchez published the complete works. Recently two of his works have been given careful editions: J. D. Fitz-Gerald published a critical edition of *La Vida de Santo Domingo de Silos* (Paris, 1904); and in 1913 A. G. Solalinde published a paleographic edition of *El Sacrificio de la Misa.* Consult also: J. D. Fitz-Gerald, *The Versification of the Cuaderna Vía as found in Berceo's Vida de Santo Domingo de Silos* (New York, 1905); "Gonzalo de Berceo in Spanish Literary Criticism before 1780," in the *Romanic Review*, i, 290–301 (ib., 1910); R. Becker, *Gonzalo de Bercecos Milagros und ihre Grundlagen* (Strassburg, 1910); F. Hanssen, "Notas á la Vida de Santo Domingo de Silos," in *Anales de la Universidad de Chile*, vol. cxx, 715–763 (Santiago, Chile, 1907).

GOO′BER. See Peanut.

GOOCH, gōōch, Sir Daniel (1816–89). A British mechanical engineer and inventor, born at Bedlington, Northumberland. He learned the principles of locomotive design under Robert Stephenson. From 1837 to 1864 he was locomotive superintendent of the Great Western Railway and in this connection became known for the original design and general excellence of his locomotives. In 1843 he invented the "suspended link motion with the shifting radius link" for locomotives. In 1865–66 Gooch had charge of laying cables across the Atlantic Ocean, upon the successful completion of this task being created Baronet. In 1866 he took charge of the reorganization of the Great Western Railway, which he soon placed on a sound financial footing. From 1865 to 1885 he was a member of Parliament. Consult his *Diaries* (London, 1892).

GOOCH, Frank Austin (1852–). An American chemist, born at Watertown, Mass., and educated at Harvard University (A.B., 1872; Ph.D., 1877). In 1873 he became instructor in chemistry in the Lawrence Scientific School. A year later he was assistant in the chemical laboratory and in 1877 assistant to Wolcott Gibbs. In 1879 he was connected with the chemical laboratory of the Geological Survey at Newport as a special agent of the tenth census, in 1881 was appointed chemist to the Northern Transcontinental Survey, and in 1885 became professor of chemistry at Yale. His writings include: *Outlines of Inorganic Chemistry*, with C. F. Walker (1905); *Outlines of Qualitative Chemical Analysis*, with P. E. Browning (1906; 3d ed., 1911); *Methods in Chemical Analysis* (1912).

GOOCH, Sir William (1681–1751). An English soldier and Colonial Governor in America. He was born in Yarmouth, served with distinction in the English army, and from 1727 to 1747 was Governor of Virginia. He was a man of considerable ability, and his administration was, on the whole, a wise and prosperous one. In 1740 he led the Virginia troops which accompanied Admiral Vernon on his futile expedition against Cartagena, New Granada. On his return to England in 1749 he was made Baronet.

GOOD, James Isaac (1850–). An American Reformed church clergyman and historian, born at York, Pa. He graduated at Lafayette College in 1872 and at Union Theological Seminary in 1875. He was settled in pastorates in York, Pa. (1875–77), Philadelphia (1877–90), and Reading, Pa. (1890–1905). Between 1890 and 1907 he was professor and dean of the school of theology of Ursinus College (Philadelphia), then becoming professor of Reformed church history and liturgics at the Central Theological Seminary (Dayton, Ohio). He was elected president of the General Synod of the Reformed Church in the United States. He wrote: *The Origin of the Reformed Church in Germany* (new ed., 1913); *The History of the Reformed Church in Germany* (1894); *Rambles around Reformed Lands; History of the Reformed Church in the United States* (1899); *Famous Places of the Reformed Churches* (1910); *History of the Reformed Church in the United States in the Nineteenth Century* (1911); *History of the Swiss Reformed Church since the Reformation* (1913); *The Heidelberg Confession in its Newest Light* (1914); and he contributed to the New International Encyclopædia.

GOOD, John Mason (1764–1827). An English physician and author, born at Epping in

Essex. In 1784 he practiced as surgeon in Sudbury, but removed to London in 1793, with the view of obtaining literary employment. He published various poems, translations, and professional treatises. Among his translations are: *The Song of Songs, or Sacred Idyls,* from the Hebrew (1803); *The Nature of Things,* from Lucretius (1805); *The Book of Job* (1812). His chief professional works are *The Study of Medicine* (4 vols., 1822) and *The Book of Nature,* a series of lectures at the Surrey Institution, 1811-12 (1826). He likewise published, in conjunction with Olinthus Gregory, a dictionary of the arts and sciences completed in 12 volumes (1813). The translation of Lucretius, valuable for its parallel passages, is included in Bohn's Classical Library. He died in London. For his *Life and Writings,* consult Gregory (London, 1828).

GOOD'ALE, Elaine (1863-) and Dora Read (1866-). American poets, sisters, who were born in Berkshire Co., Mass. They showed remarkable poetic precocity. Poems of Elaine appeared as early as her eighth year, in *Sky Farm Life,* a monthly conducted by herself. In 1887 verses of both sisters began to appear in *Saint Nicholas* and their contributions to periodicals were thereafter frequent. The most noteworthy of their books are: *Apple Blossoms* (1878); *In Berkshire with the Wildflowers* (1879); *All round the Year* (1880); and *Verses from Sky Farm* (1880). In 1881 Elaine published *The Journal of a Farmer's Daughter.* In 1883 she became teacher in the Hampton (Va.) Institute for the education of Indians and negroes, and in 1885 made a tour of observation through the Sioux Reservation. In the next year she received a government appointment to teach Indians at White River Camp in Dakota and in 1890 was made superintendent of all Indian schools in that State. In 1891 she was married to Dr. C. A. Eastman (q.v.), an Indian. Dora wrote also *Heralds of Easter* (1887).

GOODALE, George Lincoln (1839-). An American botanist, born at Saco, Me. He graduated at Amherst College in 1860 and at the Harvard Medical School in 1863. He practiced his profession at Portland, Me., until 1867; became professor of natural science and applied chemistry at Bowdoin; and at Harvard was appointed instructor in botany and university lecturer on vegetable physiology (1872), assistant professor of the latter subject (1873), professor of botany (1878), and (1888) Fisher professor of natural science, a chair formerly held by Asa Gray. After 1879 he served also as director of the botanical museum. In 1909 he retired. In 1889 he was president of the American Society of Naturalists and president of the American Association for the Advancement of Science. In addition to monographs and contributions to scientific journals, his publications include: *Wild Flowers of North America* (1882); *Vegetable Physiology* (1885); *Vegetable Histology* (1885); *Useful Plants of the Future* (1891); *Concerning a Few Common Plants* (1879; 3d ed., 1903).

GOOD BEHAVIOR. As a legal expression, used chiefly as synonymous with keeping the peace. Thus, if one person assaults or threatens another or provokes him to a breach of the peace, the offense is punishable summarily by a justice of the peace, who, besides inflicting a fine, may bind over the offending party to keep the peace and be of good behavior for a specified period. The mode of doing this is by requiring the offending party to enter into a recognizance with or without sureties, which is, in fact, the giving of a bond for a specified sum to the court, and if it is broken, the recognizance is forfeited and the offending party may be again punished.

In early English law the expression was employed to denote the obligation of chastity imposed upon a widow who enjoyed real property derived from her deceased husband, as in the case of the dower right known as free bench (q.v.), or of a devise by a husband to his widow *dum se bene gesserit,* so long as she should be of good, i.e., chaste, behavior.

GOOD-CONDUCT BADGES. Special distinctions given to enlisted men in the United States navy for proficiency, sobriety, and obedience. Any person when discharged, either at expiration of enlistment of four years or within three months of expiration of enlistment, who is recommended for a good-conduct medal by his commanding officer is entitled to this badge. Recommendations are based on the following final averages in marks: for petty officers, proficiency 4.5, sobriety 4.5, obedience 4.5; for men of lower ratings, proficiency 4, sobriety 4.5, obedience 4.5. The first badge is a medal: subsequent badges are bars with the name of the vessel from which each was given engraved thereon, and are worn on a ribbon above the medal. The holder of a medal cannot be deprived of it except by sentence of a general court-martial. Every enlisted man, except a mate, receives 83 cents per month, in addition to pay of his rating, for each medal or bar he is awarded.

GOOD CONSIDERATION. In English and American law, the relationship which subsists between the parties to certain conveyances of land and which is relied on, in lieu of an actual consideration of money or money's worth, to sustain such a conveyance. The former, sometimes called the "consideration of blood," i.e., of blood relationship, or of "love and affection," was known as a "good" consideration, as distinguished from the latter, which was described as a "valuable" consideration. Any relationship of consanguinity, no matter how remote, was sufficient to constitute good consideration. It was required where a freehold estate was conveyed by the device known as a covenant to stand seised to the use of another or to give effect to a conveyance made without an express declaration that it was made to the use of the grantee or of some one else as beneficiary. As distinguished from the "covenant to stand seised," which required a "good" consideration, the conveyance by "bargain and sale" called for a valuable consideration. It is to be noted that neither form of consideration was necessary to the validity of a conveyance made in any other form, as by livery of seisin or the modern deed of grant, if only the instrument declared that the conveyance was for the use of the donee or grantee. Modern statutory forms of conveyancing have rendered the presence of a good consideration less important than it once was, but it would seem that it is still generally required where a deed of land fails to state that the conveyance is for the use of the grantor and where there is no valuable consideration therefor. See Uses; Trusts.

As used in the famous statute concerning fraudulent conveyances (13 Eliz., c. 5), where it is provided that the statute is "not to extend to any estate or interest in lands, etc., on good consideration and bona fide lawfully conveyed to any person not having notice," etc., the expression "good consideration" does not bear the technical sense in which it is employed in conveyancing, but signifies lawful, i.e., valuable, consideration. A conveyance otherwise forbidden by the statute would not be protected because made to a blood relation, but only if to an innocent purchaser for *value*. See Consideration.

GOOD COUNSEL, Book of. See Hitopadesa.

GOODE, George Brown (1851–96). An American ichthyologist, born in New Albany, Ind. He graduated in 1870 from Wesleyan University, at Middletown, Conn., and then studied under Louis Agassiz. From 1871 to 1877 he was curator of the museum at Wesleyan University, and in 1873 he became an assistant in the United States Fish Commission and also a member of the scientific staff of the United States National Museum, of which he was made assistant director in 1881. From 1887 until his death he served as the assistant secretary of the Smithsonian Institution in charge of the National Museum. He also was prominently connected with various popular and scientific exhibitions, as commissioner of the United States to the fisheries exhibitions at Berlin in 1880 and London in 1883, as representative of the Smithsonian Institution at the exhibitions at New Orleans in 1884, Cincinnati in 1888, Louisville in 1888, and Atlanta in 1895, and as successively commissioner and commissioner general of the United States at the Columbian Historical Exposition at Madrid in 1892–93. He planned classifications for, and was one of the directors of, the United States government exhibit at the World's Columbian Exposition at Chicago in 1893. In 1888 he was elected to the National Academy of Sciences; and at various times he received foreign honors, including the decoration of the Spanish Order of Isabella the Catholic, with the grade of Commander. His publications number about 400, of which these are important: *Catalogue of Fishes of the Bermudas* (1879); *History of the Menhaden* (1880); editor of *Fisheries and Fishery Industries of the United States* (7 vols., 1884–87); *American Fishes: A Popular Treatise upon the Game and Food Fishes of North America* (1888); *Oceanic Ichthyology,* with Tarleton H. Bean (1896). Goode was an authority on the management of museums and wrote: *Museums of the Future* (1890); *Principles of Museum Administration* (1896); *Annual Reports,* as director of the National Museum. He was also interested in historical studies and wrote: *The Beginnings of Natural History in America* (1886); *The Beginnings of American Science* (1889); *The Origin of the National Scientific and Educational Institutions of the United States* (1890).

GOODELL′, Henry Hill (1839–1905). An American agricultural educator, born at Constantinople, Turkey. He graduated at Amherst College in 1862 and served in the Union army during the Civil War. He was professor of modern languages and English literature in the Massachusetts Agricultural College (1867–86) and in 1886 became president of that institution. The degree of LL.D. was conferred on him by Amherst College in 1891. For many years, as chairman of the executive committee of the Association of American Agricultural Colleges and Experiment Stations, he exerted a wide influence in the great movement for agricultural education in the United States.

GOODELL, Thomas Dwight (1854–). An American classical scholar, born at Ellington, Conn. He was graduated at Yale in 1877 and received the degree of Ph.D. in 1884. He was classical teacher in the high school, Hartford, Conn., from 1877 to 1888, and in the latter year was appointed professor of Greek at Yale. In 1911 he was elected president of the American Philological Association. He is author of various philological papers in the learned journals, and of *Chapters on Greek Metric* (1901), an important work, and *A School Grammar of Attic Greek* (1902).

GOODELL, William (1792–1867). An American missionary. He was born at Templeton, Mass., educated at Phillips Academy (Andover), Dartmouth College, and Andover Theological Seminary. He was accepted as a missionary by the American Board and at the close of 1822 sailed for Malta and thence the next year went to Beirut, where he aided in establishing the station which has become the centre of the Syrian mission. In 1828, on account of threatened war between England and Turkey, the missionaries removed to Malta, where Goodell labored in preparing and printing books for the mission; until, in 1831, the way having been opened by the destruction of the Turkish fleet at Navarino, he went to Constantinople, where he commenced the Armeno-Turkish mission. During his missionary life he and his devoted wife cheerfully endured many trials and perils and were compelled to move their residence 33 times in 29 years. One of his chief labors was the translation of the Bible into Armeno-Turkish, in making and revising which he spent 20 years. In 1865, after 43 years of toil, he returned to the United States and died in Philadelphia at the residence of his son, Feb. 18, 1867. Consult his life by Prime (New York, 1876).

GOODELL, William (1792–1878). An American editor and reformer, prominent as an abolitionist in the antislavery struggle before the Civil War. He was born in Coventry, N. Y.; was engaged in business successively at Providence, R. I., Alexandria, Va., and New York City; took part in the discussion of the Missouri Compromise, to which he was strongly opposed, and in 1827 established at Providence a paper called the *Investigator.* He subsequently edited successively the *National Philanthropist,* the *Moral Daily Advertiser,* the *Friend of Man* (Utica, N. Y.), the organ of the New York State Anti-Slavery Society, the *Radical Abolitionist,* and the *Principia*—all devoted to the cause of abolitionism. Among his publications are: *Views of American Constitutional Law* (1844); *The Democracy of Christianity* (1851); *Slavery and Anti-Slavery: A History of the Great Struggle in Both Hemispheres* (1852); *The American Slave Code* (1853). Consult a *Memorial of William Goodell* (Chicago, 1879).

GOOD FAITH (Lat. *bona fides*). In law, either (1) an absence of fraudulent design in the person acquiring real or personal property by conveyance from another, or (2) ignorance on the part of an assignee or grantee of the existence of claims of third persons affecting the property conveyed. The expression is used in the former sense in the statute (13 Eliz., c. 5) making void conveyances in fraud of creditors, but saving conveyances "on good consideration and bona fide lawfully" made. This does not mean that the grantee must be ignorant of the fact that the effect of the conveyance will probably be to delay or defraud the creditors of the grantor, but that he shall not be a party to the fraud by participating in an unreal or fictitious conveyance. As thus employed, the expression does not differ materially in meaning from its ordinary sense as signifying honest dealing.

On the other hand, as used to denote the innocent holder, commonly known as the bona fide holder, of commercial paper, it signifies no more than that the present holder came into possession of the paper in due course and without notice of defenses, such as lack of consideration, which would have been available against the transferor. It is in this latter sense also that the expression is employed where property affected with a trust in favor of a third person is conveyed by the trustee to a purchaser who has no knowledge of the trust. The person acquiring the property under such circumstances takes it free from the trust, not because he is free from moral turpitude, but because, having paid value therefor in ignorance of the trust, it is deemed unconscientious to subject the property in his hands to the obligation which rested upon his grantor. See NEGOTIABLE PAPER; TRUST.

GOOD FRIDAY. The Friday before Easter, observed in commemoration of the crucifixion of Christ. That from a very early period it was a day of solemn mourning and special prayer is apparent from the *Apostolic Constitutions* (i, 18) and from Eusebius, who tells us that, when Christianity was established in the Empire, Constantine forbade the holding of markets, law courts, and other public proceedings upon this day. It is still a legal holiday in England and Ireland. A number of ancient popular customs, such as the eating of "hot cross buns"—cakes with a cross impressed on them—are connected with the day. For its ceremonial observance in the Roman Catholic church, see CROSS; HOLY WEEK. A service of modern origin, increasingly popular in Catholic and Episcopal churches, is the Three Hours' Devotion, consisting of addresses upon the seven last words of Christ, prayers and hymns, and occupying the hours from 12 to 3, when He hung upon the cross.

GOOD GRAY POET, THE. A popular designation of Walt Whitman.

GOOD HOPE. See CAPE OF GOOD HOPE.

GOOD'HUE, BERTRAM GROSVENOR (1869–). An American architect. He was born at Pomfret, Conn., was educated at Russell's Collegiate and Commercial Institute, New Haven, Conn., and studied architecture for six and a half years under J. Renwick. In 1891 he became a partner in the firm of Cram and Wentworth (later Cram, Goodhue, and Ferguson) and in this connection participated in the reconstruction and additions to the United States Military Academy and in the construction of numerous ecclesiastical, academic, library, and other buildings (for list of these, see CRAM, RALPH ADAMS). In 1914 he was engaged to plan a new building for St. Bartholomew's Church, New York. He made the decorations for *The Altar Book*, contributed articles to magazines and to Sylvester Baxter's *Spanish Colonial Architecture in Mexico* (10 vols., 1903), and is author of *Mexican Memorics* (1892).

GOOD'LAND. A city and the county seat of Sherman Co., Kans., 196 miles east of Denver, on the Chicago, Rock Island, and Pacific Railroad (Map: Kansas, A 4). It contains a Carnegie library, has railroad repair shops and a grain elevator, and carries on a trade in the products of the adjacent farming and stock-raising district. There are municipal water works. Pop., 1900, 1059; 1910, 1993.

GOOD'MAN'S FIELDS THEATRE. A London theatre, erected in 1729 and torn down in 1746. The theatre erected later upon its site was destroyed by fire in 1802. Garrick made his appearance on its stage in 1741, and many of his most successful performances occurred in this playhouse.

GOOD-NATURED MAN, THE. A comedy by Goldsmith, produced by Colman at Covent Garden, Jan. 29, 1768.

GOOD'NOW, FRANK JOHNSON (1859–). An American educator and legal scholar, born in Brooklyn, N. Y. He graduated at Amherst College in 1879, at the Columbia Law School in 1882, and studied at the Ecole Libre des Sciences Politiques, Paris, and at the University of Berlin. Appointed instructor in history and lecturer in administrative law at Columbia University in 1883, he was promoted to the rank of adjunct professor in 1887 and to a full professorship in 1891. In 1906 he was a member of the Public Ownership Commission of the National Civic Federation, which investigated municipal ownership undertakings in Europe. During the years 1913–14 he served as legal adviser to the Chinese government. In 1914 he became president of Johns Hopkins University. His works include: *Comparative Administrative Law* (1893); *Municipal Problems* (1897); *Politics and Administration* (1900); *City Government in the United States* (1905); *Principles of the Administrative Laws of the United States* (1905). He was editor of *Selected Cases on the Law of Taxation* (1905); *Selected Cases on Government and Administration* (1906); *Selected Cases on the Law of Officers* (1906); *Social Reforms and the Constitution* (1914).

GOOD PARLIAMENT. The English Parliament of 1376, famous for its attempts at political reform and for its impeachment of Latimer, Neville, and others.

GOOD QUEEN ANNE. A designation of Anne of Bohemia, wife of Richard II of England.

GOOD QUEEN BESS. A popular name for Elizabeth, Queen of England.

GOOD RE'GENT, THE. A title given to James Stuart, Earl of Murray, or Moray, who was Regent of Scotland between 1567 and 1570.

GOOD'RICH, ALFRED JOHN (1847–). A widely known American musical theorist. He was born at Chilo, Ohio, and was practically self-taught. He held appointments as professor of theory in many of the leading musical institutions in the United States and for two years served on the faculty of the Martha Washington College, Abingdon, Va. After 1899 he devoted himself to private teaching and writing. His essays and other published works include: *Music as a Language* (1880); *The Art of Song* (1888); *Complete Musical Analysis* (1889); *Analytical Harmony* (1894); *The Theory of Interpretation* (1898); *Synthetic Counterpoint* (1903).

GOODRICH, Caspar Frederick (1847–). An American naval officer, born in Philadelphia. He graduated from Annapolis in 1864 and served on the *Macedonian* in the summer of that year. Promoted through the various grades, he became captain in 1897 and rear admiral in 1904. He served as naval attaché on the staff of Sir Garnet Wolseley during the Tel-el-Kebir campaign in 1882, brought the Greely relief ship *Alert* to New York in 1884, was in charge of the Torpedo Station in 1886–89, and was president of the Naval War College in 1897–98. During the Spanish-American War he commanded the *St. Louis* and *Newark.* He was commandant of the Portsmouth (Va.) Navy Yard in 1903–04 and of the New York Navy Yard in 1907–09 and was commander in chief of the Pacific squadron in 1905–06.

GOODRICH, Charles Augustus (1790–1862). An American author, brother of Samuel G. Goodrich (q.v.). He was born at Ridgefield, Conn.; graduated at Yale in 1812; was long pastor of congregations at Worcester, Mass., Berlin, Conn., and Hartford, Conn.; and became favorably known through his writings, which include: *Lives of the Signers to the Declaration of Independence* (1829); *Family Tourist* (1848); *Geography of the Chief Places Mentioned in the Bible* (1855); *History of the United States* (1852–55; rev. ed., 1867).

GOODRICH, Chauncey Allen (1790–1860). An American scholar, born at New Haven, Conn., and son of Elizur Goodrich. He graduated at Yale University in 1810, was a tutor there from 1812 till 1814, and then studied theology. He was ordained pastor of the First Congregational Church in Middletown, Conn., in 1816; in 1817 he resigned his charge to become professor of rhetoric in Yale. This chair he held until 1839, when he was transferred to that of pastoral theology in the Divinity School. He published a *Greek Grammar* (1814); *Greek and Latin Lessons* (1832); *Select British Eloquence* (1852); and superintended the abridgment of *Webster's Dictionary* (1847). At the time of his death he was engaged in a revision of this work, which afterward was published under the supervision of Noah Porter (1864). From 1829 till 1838 Dr. Goodrich edited the *Quarterly Spectator.*

GOODRICH, Elizur (1734–97). An American Congregational clergyman. He was born in Wethersfield (now Rocky Hill), Conn., graduated at Yale in 1752, and from 1756 to 1797 was pastor of a church at Durham, Conn. He devoted much of his time to the study of the mathematical and astronomical sciences and wrote an excellent account of the aurora borealis of 1789.

GOODRICH, Frank Boott (1826–94). An American author, son of Samuel Griswold Goodrich. He was born in Boston, graduated at Harvard in 1845, and was for some time the Paris correspondent of the New York *Times,* writing under the signature of "Dick Tinto." His articles were published in book form in 1854, under the title *Tri-Colored Sketches of Paris.* Goodrich also published: *The Court of Napoleon* (1857); *History of Maritime Adventure, Exploration, and Discovery* (1858); *Women of Beauty and Heroism* (1859); *World-Famous Women, from Semiramis to Eugénie* (1890); *Remarkable Voyages: or, Man upon the Sea* (1873).

GOODRICH, Joseph King (1850–). An American writer on Oriental and other subjects. He was born in Philadelphia and was educated in the Hopkins Grammar School of New Haven, Conn. He organized the department of ethnology in the United States National Museum at Washington in 1881–84, was assistant editor of the Smithsonian Institution in 1884–86, and from 1886 to 1910 served as professor of English at the Imperial Government College at Osaka, Japan, and later at Kyoto, Japan. He is author of *The Coming China* (1911); *Africa of To-Day* (1912); *Russia in Europe and Asia* (1912); *The Coming Mexico* (1913); *Our Neighbors—The Japanese* (1913); *Coming Hawaii* (1914); and articles on Chinese and Japanese art, language, and literature.

GOODRICH, Samuel Griswold (1793–1860). An American author, who wrote under the pseudonym "Peter Parley," and perhaps was most widely known for his school histories. He was born in Ridgefield, Conn., Aug. 19, 1793. He was a book publisher in Hartford, and later in Boston, Mass., where he edited the *Token* (1828–32), an original annual noted for the encouragement given to young American authors. His numerous juvenile and educational works gave him a wide reputation. Altogether in his life he edited or wrote some 170 volumes under his pseudonym, of which, however, he was sole author of only the following: *The Outcast, and Other Poems* (1836); *Sow Well and Reap Well: or, Household Education* (1838); *Five Letters to my Neighbor Smith* (1839); *Sketches from a Student's Window* (1841); *Ireland and the Irish* (1842); *Poems* (completed, 1851); *Recollections of a Lifetime: or, Men and Things I Have Seen* (1856); *Peter Parley's Own Story* (1864). He was United States Consul at Paris in 1852, where he published a statistical work on the United States. He died at Hartford, Conn., May 9, 1860.

GOODRICH, or **GOODRICKE,** Thomas (c.1485–1554). An English ecclesiastic. He studied at Corpus Christi College, Cambridge, and in 1510 was made a fellow of Jesus College. As rector of St. Peter Cheap (1529), he was consulted on the legality of the marriage of Catharine of Aragon and was appointed syndic of Cambridge for the settlement of that question (1530). Soon after he became chaplain to the King and in 1533 went to France on an embassy. In the following year he became Bishop of Ely and proved a zealous partisan of the Reformation, urging the spiritual headship of the King and helping compile the *Bishops' Book.* Under Edward VI he became a member of the Privy Council and was one of the compilers of the Book of Common Prayer. In 1552 he became Lord High Chancellor and sealed Edward's settlement of confession, but was ignorant of its contents. He was pardoned by Queen Mary for his part in placing Lady Jane Grey on the throne and, although he lost the chancellorship, was permitted to keep his bishopric until his death, May 10, 1554.

GOODRICH, (John) Wallace (1871–). An American musician, born at Newton, Mass. He studied at the Royal Academy of Music, Munich, in 1894–95, and in Paris and Leipzig for two years, and in 1897 joined the faculty of the New England Conservatory of Music, where he was appointed dean in 1907. He was organist of Trinity Church, Boston (1902–09), and of the Boston Symphony Orchestra (1897–1909), and conducted (1901–07) the Choral Art

Society of Boston, which he had founded, the Worcester County Musical Association (1902–07), the Cecilia Society of Boston (1907–10), and the Boston Opera Company (1909–12). He published *Syllabus of the Course of Lectures upon the Ritual Music of the Protestant Episcopal Church in the United States of America* (1912).

GOODRICKE, Thomas. See Goodrich, Thomas.

GOODS AND CHATTELS. A legal as well as popular expression, in common use, to signify personal property. The two words are not identical in meaning, however, the term "chattels" being the more extensive in signification and including the other. The term "goods" corresponds closely in meaning to the *bona* of the common law and to *movables* of the civil law, i.e., chattels movable, including domestic animals and certain incorporeal rights such as copyrights, patent rights, etc.; whereas chattels includes as well certain rights in land, i.e., *chattels real,* such as estates for years, the interest of a mortgagee in mortgaged land, etc. The term "goods" is now generally employed as coextensive in meaning with the old expression, "goods, wares, and merchandises," used in the seventeenth section of the Statute of Frauds. See Bona; Chattel.

GOOD′SELL, Daniel Ayres (1840–1909). An American Methodist Episcopal bishop, born in Newburgh, N. Y. He graduated at the University of the City of New York in 1859 and soon after entered the Methodist ministry. He was elected Bishop in 1888. Besides contributions to the religious press, he wrote *Nature and Character at Granite Bay* (1901), a book which in its general character suggests the genius of Burroughs; *The Things which Remain, an Address to Young Ministers* (1904); *Peter the Hermit,* in "Men of the Kingdom Series" (1906).

GOOD′SIR, John (1814–67). A Scottish anatomist, born at Anstruther, Scotland. He studied at St. Andrews University; graduated in medicine at the Royal College of Surgeons, Edinburgh; practiced in Anstruther; was made conservator of the museum of the College of Surgeons, Edinburgh (1840); acted as lecturer on pathology of tumors from 1842 to 1843; was assistant professor of anatomy, University of Edinburgh, from 1844 to 1846; and succeeded Munro as professor of anatomy in 1846. Consult *Memoir,* by Turner (Edinburgh, 1868).

GOOD′SON, Katharine (1872–). A distinguished English pianist, born in Watford (Hertfordshire). In 1886 she entered the Royal Academy of Music, where she studied under Beringer until 1892. For four years (1892–96) she was a pupil of Leschetizky in Vienna. Immediately after her return she made her début in London, meeting with unusual success. In 1899–1900 she made a triumphal tour of Germany and Austria. Her first American tour was in 1907, when she was received with such enthusiasm that she made several subsequent visits. Her special characteristics are a marked individuality of style and extraordinary magnetism. In 1903 she was married to the English composer Arthur Hinton (q.v.).

GOODSPEED, (Joseph) Arthur Willis (1860–). An American physicist, born at Hopkinton, N. H. He graduated from Harvard University in 1884 and in 1889 from the University of Pennsylvania (Ph.D.), where he was an assistant in 1884–85, an instructor in 1885–89, an assistant professor in 1889–1904, and professor of physics after 1904. His scientific articles deal mostly with the Röntgen rays and their application, with radioactivity, and with constants of the induction coil.

GOOD′SPEED, Edgar Johnson (1871–). An American Greek scholar, born at Quincy, Ill. He graduated from Denison University (Ohio) in 1890 and studied also at Yale, Chicago (Ph.D., 1898), and Berlin. After teaching the classics for several years in preparatory schools, he was appointed to the faculty of the University of Chicago, becoming associate professor in 1911. In 1902 he was made assistant director of the Haskell Oriental Museum. He joined the editorial staff of the *American Journal of Theology* and is editor or author of *Greek Papyri from Cairo Museum* (1902); *Asterius,* with Galusha Anderson (1904); *Homeric Vocabularies,* with William B. Owen (1906; 2d ed., 1909); *Index Patristicus* (1907); *The Epistle to the Hebrews* (1908); *Index Apologeticus* (1912); *Die griechische Apologeten,* with M. Sprengling (1914); *The Freer Gospels* (1914).

GOOD TEM′PLARS, International Order of. A world-wide fraternal society, having for its object the promotion of total abstinence for the individual and prohibition for the state and nation and the world, organized at Syracuse, N. Y., in 1851. The Right Worthy Grand Lodge was organized at Cleveland, Ohio, in 1855.

The order was introduced in England in 1868 and in a short time spread throughout the civilized world, its ritual being translated into some 18 different languages. The question of admission of colored persons in 1874 caused a schism in the organization; a section of the order then organized under the name of the Right Worthy Grand Lodge of the World. The two branches were reunited through the efforts of John B. Finch, R.W.G.T., at Saratoga, N. Y., in 1887. The Prohibition party was formed in 1869 by a committee appointed by the Right Worthy Grand Lodge. The Woman's Christian Temperance Union was formed in 1874 by Good Templar women. The Washingtonian House for Inebriates at Chicago, Ill., and the Orphans' Home at Vallajo, Cal., were founded by the order. The name of the supreme governing body of the order has been changed to International Supreme Lodge, which meets triennially. The College of Good Templary is maintained by the order. The course of study, covering from one to three years, is designed to inculcate the principles of the temperance reform movement. Its graduates receive the degree of Master of Temperance Literature.

The organization in 1914 comprised two national Grand Lodges (United States and Canada), 67 Grand Lodges, aggregating 680,665 members, including 263,410 in the Juvenile branch, distributed through the United States, Great Britain, Germany, Denmark, Sweden, Norway, France, Switzerland, Asia, South Africa, Australia, and New Zealand. Members are required to pledge "that they will never buy, sell, use, furnish, or cause to be furnished, to others as a beverage, any spirituous or malt liquors, wine, or cider, and will discountenance the manufacture and sale thereof in all proper ways."

GOOD WILL. The favorable disposition or inclination of persons to extend their patronage to a particular firm or corporation on account of the reputation it has established. Good will is something more than the probability that old customers will resort to the old place. It includes every advantage or benefit accruing to a business establishment from its locality, name, or common reputation, from its business habits, connections, and standing, or from any other matter which identifies and distinguishes it from other establishments. The good will of a business is property as much the subject of valuation and transfer as any tangible chattel. It is an asset of a business and may be taken into account in deciding whether a business establishment is solvent or insolvent. In a litigated case in England the good will of a partnership was valued at £20,000. The New York Court of Appeals has decided that the good will of a corporation organized under the laws of another State, but having its place of business in New York, is taxable in New York as property employed there by the corporation. Under the dissolution of a partnership, as in case of death of a partner, the good will of the concern must be converted into cash and its proceeds distributed, precisely as though it were tangible property. Upon a sale of the entire partnership business and assets the purchaser becomes entitled to the good will. This includes the sole right to hold himself out as the successor of the firm. In England and in some of the United States he acquires the right to use the old firm name, subject only to the qualification that he must not hold out the former partners as doing business under the old name, while in other States such right can be acquired only by express agreement to that effect.

The extent to which the seller of the good will of a business can compete with the buyer is a subject upon which the authorities are at variance. The tendency of modern decisions in England is to limit the seller more narrowly than the courts have felt disposed to do in the United States. Accordingly they hold that the seller of a good will must not in any way solicit patronage from the customers of the old business, nor in any way represent himself as succeeding to such business. In the absence of a contract to the contrary, however, he may engage in the same line of business in the same locality and in his own name, although that name may be a part of the old business name. In the United States, on the other hand, the seller of a business may usually compete with the buyer provided the competition be fair and free from fraud. If the purchaser of a good will would cut the seller off from soliciting old customers he must secure from him a contract surrendering those rights. Consult: Pollock, *Digest of Partnership*, § 39 (8th ed., London, 1905); Sebastian, *The Law of Trademarks* (4th ed., ib., 1889); Hopkins, *The Law of Trademarks, Tradenames, and Unfair Competition* (2d ed., Chicago, 1905); Dicksee and Tillyard, *Goodwill and its Treatment in Accounts* (3d ed., New York, 1906); Lindley, *Treatise on the Law of Partnership* (8th ed., Toronto, 1912). See Restraint of Trade, Contracts in.

GOOD'WIN, Arthur (1593–1643). An English soldier, prominent during the Civil War in England. He studied at Magdalen College, Oxford, with his lifelong friend, John Hampden, and with the latter contributed Latin verses to the college collection, *Luctus Posthumus*, published on the death of Henry, Prince of Wales. He became a member of the Inner Temple in 1613; entered Parliament in 1620 and was elected again in 1623, 1625, and 1640; and on the outbreak of the Civil War was appointed colonel of a regiment of cavalry which proved of great assistance to the Parliamentary party. In 1642, aided by Hampden and Lord Brooke, he defeated the Earl of Northampton at Coventry in Warwickshire, and with the aid of Colonel Hurry drove Lord Digby from Wantage. In January, 1643, Goodwin was appointed commander in chief of the forces of Buckinghamshire, was defeated in an attack on Brill, and took an active part in the siege of Reading.

GOODWIN, Harry Manley (1870–). An American physicist and chemist, born in Boston. He graduated in 1890 from Massachusetts Institute of Technology, where, though at intervals absent for study at Harvard University and at the universities of Leipzig and Berlin, he was a member of the faculty after 1890, in 1906 becoming professor of physics and electrochemistry with supervision of the department of electrochemistry. He is known for his studies on the voltaic cell, on the viscosity of mercury vapor and of fused salts, and on the electric conductivity of dilute acid solutions. He is author of *Physical Laboratory Experiments* (1904; 3d ed., 1911) and *Elements of the Precisions of Measurements and Graphical Methods* (1908; 4th ed., 1913).

GOODWIN, John (c.1594–1665). An English Puritan divine. He was born in the County of Norfolk about 1594, graduated at Queen's College, Cambridge, and obtained a fellowship there in 1617. Having married, he gave up his fellowship and took orders, officiating in various places in the county with much acceptance. In 1632 he removed to London and in 1633 succeeded John Davenport (q.v.) at St. Stephens. In 1635 he was admonished for leanings towards independency. In 1639 he occasioned dissatisfaction by insisting on the need of a learned ministry. In 1642 he published *Anti-Cavalierisme*, in support of the Parliamentary cause, which received further commendation in *Might and Right Well Met* (1648). In 1643 he assailed the theory of the divine right of kings in his *Os Ossorianum; or, A Bone for a Bishop* and in 1644 denounced the Presbyterians as a persecuting party in *Θεομαχία: or, The Grand Imprudence of Fighting Against God.* In 1645 he was ejected from his living for refusing to administer the sacrament to all indiscriminately and formed an independent church, which was largely attended. At the Restoration he was one of 18 incapacitated from holding any public trust. He died in 1665. Many of his publications, though all in English, have Greek or Latin titles. He has been a favorite with Methodists and been called the "Wiclif of Methodism." John Wesley abridged his *Treatise of Justification* (London, 1642). Samuel Dunn, a Wesleyan minister, edited his *Christian Theology* (London, 1836) from Goodwin's works and wrote his life. His *Redemption Redeemed* was republished in London in 1842. The standard life of Goodwin is by Thomas Jackson, another Wesleyan minister (London, 1822).

GOODWIN, Nat(haniel) C(arl) (1857–). An American actor. He was born in Boston and after a brief experience in business made his début, on March 5, 1874, at the Howard Athenæum, in a piece called *Law in New York.* His success in imitating personal peculiarities led him to the variety stage, and at Pastor's Theatre, in New York (1875), he became very popular. Later he made a hit in the burlesque of *Black-Eyed Susan.* He married in 1877 Eliza Weathersby, an actress, under whose name his company toured successfully. Most of his work was in lighter comedy, till in 1889–90 he appeared as Woolcott in *A Gold Mine.* The following summer he first played in England. Among his productions since have been: *A Gilded Fool; In Mizzoura; An American Citizen; Nathan Hale,* his greatest success (produced in Chicago, Jan. 31, 1898); *The Cowboy and the Lady* (1899); *The Altar of Friendship* (1902); *A Midsummer Night's Dream* (1903); *Beauty and the Barge* (1905). In 1907 he toured in repertoire, in 1911 he played in vaudeville, and in 1912–13 he made a great success, artistic and financial, as Fagin in the centenary production of *Oliver Twist.* Consult: Strang, *Famous Actors of the Day in America* (Boston, 1900); McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896); Winter, *The Wallet of Time* (2 vols., ib., 1913); and the autobiographical *Nat Goodwin's Book* (Boston, 1914).

GOODWIN, Thomas (1600–80). An English divine of the later Puritan period. He was born at Rollesby, Norfolk, studied at Cambridge, and became a fellow in 1620. In 1625 he was licensed a preacher of the university, and three years later became lecturer of Trinity Church, Cambridge, and was presented the vicarage by the King in 1632. Harassed by the interference of his Bishop, who was an adherent of Laud, he resigned his preferments and left the university in 1634. He then seems to have lived for some time in London as a Separatist preacher. In 1639 he withdrew to Holland and for a few months was pastor of a small congregation of English merchants and refugees at Arnheim. Returning to London soon after Laud's impeachment by the Long Parliament (1640), he ministered for 10 years to an independent congregation in the parish of St. Dunstan's-in-the-East and rapidly rose to considerable eminence as a preacher. In 1643 he was elected a member of the Westminster Assembly and at once identified himself with the Congregational party. He frequently preached by appointment before the House of Commons, and in January, 1650, his talents and learning were rewarded with the presidentship of Magdalen College, Oxford, a post which he held until the Restoration (1660). He rose into high favor with the Protector and ultimately became somewhat prominent among his more intimate advisers. From 1660 until his death, Feb. 23, 1680, he lived in London and devoted himself exclusively to theological study and to the charge of a small congregation. Five volumes of his works were published at London (1682–1704; reprinted in Edinburgh, 1861–66).

GOODWIN, William Watson (1831–1912). A distinguished American classical scholar, born at Concord, Mass. He was graduated from Harvard in 1851 and then continued his studies at the universities of Bonn, Berlin, and Göttingen, receiving from Göttingen the degree of Ph.D. in 1855. He was tutor at Harvard (1856–60) and Eliot professor of Greek there (1860–1901). In 1901 he became Eliot professor emeritus. He was the first director of the American School of Classical Studies at Athens (1882–83) and in 1872 and 1885 was president of the American Philological Association. In 1860 he published the first edition of his *Syntax of the Moods and Tenses of the Greek Verb.* This work has contributed more than any other single book in America and England to the elucidation of Greek syntax and it has received generous recognition in Germany. It was published in revised and enlarged form in 1865 and 1890. He published also a *Greek Grammar* (1870; last ed., 1893). Both these books owed much, in their later editions, to the writings of B. L. Gildersleeve (q.v.). He edited also Demosthenes *On the Crown* (Cambridge, 1901) and Demosthenes *Against Meidias* (ib., 1906), scholarly works both, showing thorough knowledge of Attic law and Greek history. He was also a contributor to American journals and scientific publications, especially to the *Transactions of the American Philological Association* and *Harvard Studies.* Professor Goodwin received the degree of LL.D. from Amherst (1881), Cambridge, England (1883), Columbia (1887), Edinburgh (1890), Harvard (1891), Chicago (1901), Yale (1901); D.C.L., Oxford (1890); and was also Knight of the Greek Order of the Saviour. Consult Gildersleeve, *American Journal of Philology,* xxxiii, 367–368 (New York, 1912), and Eliot, *William Watson Goodwin* (Boston, 1913).

GOODWIN SANDS. Dangerous banks of shifting sands stretching for a distance of about 10 miles northeast and southwest, 5 to 12 miles off the east coast of Kent, England (Map: England, H 5). The sands are divided into two portions by a narrow channel, and at low water many parts are uncovered. When the tide recedes, the sand becomes firm and safe; but during the flow the water permeates the mass, rendering the whole pulpy and treacherous, in which condition it shifts to such a degree as to render charts uncertain from year to year. They have always been dangerous to vessels passing through the Strait of Dover, bound either for the Thames or traversing the North Sea. They serve, however, as a breakwater to form a secure anchorage in the Downs (q.v.) when east or southeast winds are blowing, but become dangerous when the wind blows strongly off shore, at which time ships are apt to drag their anchors and to strand upon the Goodwin breakers, in the shifting sands of which their wrecks are soon entirely swallowed up. Many celebrated and terribly fatal wrecks have occurred here, and many gallant rescues by local seamen have been made. Numerous buoys, fog sirens, warning guns, four lightships, and the North and South Foreland lighthouses now afford a valuable system of warning and protection. These sands are said to have consisted at one time of about 4000 acres of lowland, fenced from the sea by a wall. At the period of the Norman Conquest these estates were taken from Earl Godwin and bestowed upon the abbey of St. Augustine at Canterbury, the abbot of which allowing the sea wall to fall into a dilapidated condition, in the year 1100, the sea rushed in and submerged the whole. Near the Goodwin Sands the Dutch won a naval victory over the English in 1652.

GOOD'WOOD. An estate of the Duke of Richmond and Gordon, 3 miles east of Chichester, Sussex, England, chiefly noted for the annual race meeting held in July on the course established in the park in 1802. The castle, an eighteenth-century structure, has a fine collection of portraits by old masters; the park is celebrated for the beauty and variety of its trees and contains herds of deer. In it is a temple containing a Roman relief of Neptune and Minerva found at Chichester.

GOOD'YEAR, Charles (1800–60). An

American inventor, born at New Haven, Conn. He was the son of an iron manufacturer, with whom, at the age of 21, he went into business in Philadelphia. Unsuccessful in the iron trade, his attention was attracted to the manufacture of India rubber, and he expended all his means in experiments with various mixtures and processes which should remedy the fatal defects of India rubber in its natural state, since it is brittle in cold weather and sticky in warm weather. His efforts were a series of failures, excepting a partial success in treating the surface of rubber goods with nitric acid, until he bought of one Hayward, a rival experimenter, an invention for mixing India rubber with sulphur. The great secret of vulcanizing—a process in which the two substances, submitted to a high temperature, are converted into the elastic, enduring, and heat-and-cold-defying material now in use—was an accidental discovery made by Goodyear while standing by a stove and idly subjecting a mixture of rubber and sulphur to its heat. This new product he patented in 1844, discovering new uses to which it could be applied, until it required 60 patents to secure his inventions. Some of these rights were secured by other persons in England, and in France they were forfeited by an informality; so that, by these means and from expensive lawsuits, he gathered little save the honors awarded to his skill and perseverance. See RUBBER. Consult biographical sketch in Parton, *Famous Americans of Recent Times* (Boston, 1867; 11th ed., 1897), and B. K. Peirce, *Trials of an Inventor* (New York, 1866).

GOOD'YEAR, ELLSWORTH D. S. (1827–1910). An American soldier and inventor, born at New Haven, Conn. In 1846 he moved to New York City, where he engaged in the rubber trade. Sharing in the experiments that have gained renown for his family's name, he himself invented a process of making hollow rubber goods. During the Civil War he was captain for three years of a company of the Tenth Connecticut Volunteers. Promoted lieutenant colonel, he commanded a regiment in General Grant's line of battle before Petersburg, Va. On April 2, 1865, he led the assault on Fort Gregg and in spite of frightful losses succeeded in holding the position gained by his regiment. For this service he was brevetted brigadier general. In 1867 he was a member of the Connecticut Legislature, and from 1868 to 1884 he was United States customhouse inspector at New Haven, Conn.

GOODYEAR, WILLIAM HENRY (1846–). An American art historian and curator. He was born in New Haven, Conn., the son of Charles Goodyear (q.v.), the inventor; graduated at Yale in 1867; and studied art history in Heidelberg and in Berlin (1867–70). He traveled extensively in Europe and the near Orient in making his original studies, especially in architecture. From 1881 to 1886 he was curator in the Metropolitan Museum of Art, New York, and after 1899 he was curator of fine arts in the Brooklyn Institute Museum. Professor Goodyear is especially known for his discoveries in the architectural refinements, particularly in mediæval church buildings. In numerous contributions to scientific periodicals he demonstrated that Egyptian, Greek, Roman, and mediæval buildings are constructed with intentional asymmetry, intended for optical effects. He became honorary member of societies in Rome, Edinburgh, Milan, and Venice, and a corresponding member of the Society of American Architects. His principal publications include: *A History of Art* (1887); *The Grammar of the Lotus* (1891); *Roman and Mediæval Art* (1893); *Renaissance of Modern Art* (1894); *Greek Refinements* (1912).

GOODY TWO-SHOES. A familiar nursery tale, published by Newbery in 1765 and ascribed to Oliver Goldsmith.

GOOGE, gōōj, BARNABE (1540–94). An English poet. He was born in 1540 at Alvingham in Lincolnshire, studied at Cambridge and at Oxford, traveled on the Continent, and on his return became one of the gentlemen pensioners in the court of Queen Elizabeth. Consult "Eglogs, Epytaphes, and Sonnetes"—originally published in 1563—in Arber, *English Reprints* (London, 1871), and *The Popish Kingdome* (1570), a verse translation from the Latin of Thomas Naogeorgus (i.e., Thomas Kirchmayer), ed. by Hope (London, 1880).

GOO'KIN, DANIEL (1612–87). A New England soldier and historian, born in Kent, England. Gookin came with his father to Virginia in 1621, but, sympathizing rather with the Puritan than with the Cavalier, he moved, in 1644, to Cambridge, Mass., where he was soon made captain of militia and elected to the House of Deputies, of which he became Speaker in 1651. In 1652 he was elected magistrate and in 1656 appointed superintendent of all Indians under civil authority. He held this office till death in spite of unpopularity occasioned by the protection he gave to his wards during and after King Philip's War. He was associated with Eliot in mission work among the Indians. He visited England in 1656 and again in 1657, efficiently protecting on his return in 1660 the fugitive regicides Goffe and Whalley. In 1674 he wrote *Historical Collections of the Indians of Massachusetts* (published by the Massachusetts Historical Society, 1792), and later a never-published and now lost *History of New England.* In 1677 he finished *An Historical Account of the Doings and Sufferings of the Christian Indians of New England,* which was sent to England, and there lost for over a century and a half, when it was found and printed in 1836 by the American Antiquarian Society. In 1681 Gookin was made major general of the Colony and was an active asserter of popular rights in the agitation which preceded the withdrawal of the Colonial Charter (1686). He was a man of fine character and an historian of balanced judgment and dignified, though not easy, style. Consult F. W. Gookin, *Daniel Gookin . . . his Life and Letters* (privately printed, Chicago, 1912).

GOOLE, gōōl. A market town and river port in the West Riding of Yorkshire, England, 22 miles south-southeast of York, on the right bank of the Ouse at its junction with the Don, 47 miles from the open sea at the mouth of the Humber (Map: England, F 3). The town is well built and possesses fine modern public buildings. Water and gas are supplied by private companies. It has iron foundries, ship and boat-building establishments, and extensive manufactories of woolen and cotton goods, ropes, sails, alum, sugar, and agricultural implements. It has a commodious harbor, wet and dry docks, quays, and warehouses, and imports raw wool, linen yarn, timber, logwood, indigo, oil, wines, farm produce, and groceries. Its chief exports are coal, woolen and linen goods, and machinery.

It has a passenger service with Antwerp, Amsterdam, Copenhagen, and other ports in north Europe. The value of its imports for 1912 amounted to about $44,581,000 and its exports to $54,891,000. The total tonnage of vessels entered and cleared in foreign and colonial trade was 1,449,161 tons. Its rise from an obscure hamlet dates from the opening of the Knottingley Canal, which brought about its establishment as a bonded port in 1829. Pop., 1901, 16,576; 1911, 20,332.

GOORKHAS, go͞or′kas. See Gurkhas.

GOOROO, go͞o′ro͞o. See Guru.

GOOSAN′DER. See Merganser.

GOOSE (AS. *gōs*, Icel. *gās*, OHG. *gans*, Ger. *Gans;* connected with Lat. *anser*, Gk. *χήν*, *chēn*, OIr. *géis*, Lith. *zansìs*, Skt. *haṃsa*, goose, also ultimately with OHG. *ganazzo*, AS. *ganot*, Eng. *gannet*, and AS. *gandra*, Eng. *gander*). A web-footed bird of the subfamily Anserinæ, of the family Anatidæ, order Anseres (q.v.). The geese are closely allied to the swans on the one hand and to the ducks on the other. They differ from the swans in having the lores feathered and from the ducks in having the tarsi reticulate and the sexes alike in color. The geese form a fairly well-defined group of about 40 species found in all parts of the world. They are mostly larger than ducks and have longer necks. They are more terrestrial and many times are to be seen feeding on land herbage. They walk better than ducks, the legs not being quite so far back. Most of them are good eating, but there are a few, which are animal feeders, whose flesh is rank. Like the swans, they resent intrusion by hissing with outstretched neck. They utter characteristic notes called *honking* when on the wing. They generally fly in companies, each led by an old gander, which they follow in a wedgelike formation.

Wild Geese. Of the ten or twelve species of geese occurring in the United States, all but two or three breed in the far north and are migrants and winter visitants south of Canada. The common wild goose (*Branta eanadensis*) is abundant throughout North America. It is about 3 or 3½ feet long and 5 feet across the wings. The head and neck are black, with a white patch on the chin; general color brownish gray, paler below. The nest is usually on the ground, but sometimes in trees. The eggs are usually five or six, plain buffy white. A remarkable Arctic goose is the emperor goose (*Philaete eanagiea*), about two-thirds as large as the common goose, abundant on the shores of Bering Sea; the flesh is said to be rank and unfit for food. The snow goose (*Chen hyperboreus*) is a pure-white one, found throughout America, but rather rare in eastern parts. The so-called "tree ducks" (*Dendrocygna*) are tropical American geese occurring as far north as Texas in the summer. They are only about 20 inches long and are colored with various shades of yellowish and reddish brown. They make their nests in hollow trees, often some distance from water.

Among the notable geese of the Old World must be mentioned the graylag goose (*Anser anser*), which is thought to be the ancestral stock of the common domesticated goose. (See Colored Plate with Water Birds.) It is found in central Europe and Asia and in north Africa. Another, common in Great Britain, is the bean goose (*Anser fabalis*), small and brownish, with a black "nail" on the beak. The spur-winged goose (*Plectropterus gambensis*) is a purplish-black bird, with prominent spurs on the wings, found in Africa. In Australia there are two very remarkable geese—one (*Anseranas semipalmata*) with the feet little more than half webbed, and the other (*Cereopsis novæ-hollandiæ*), a scarcely aquatic bird, with long legs having the tibia partly bare and the bill small and membranous. Among the best known of the geese are the brants and barnacle geese (qq.v.). Consult D. G. Elliot, *Wild Fowl of the United States and British Possessions* (New York, 1898); and L. H. D. Shaw, *Wild Fowl* (ib., 1905). See Plate of North American Wild Ducks in the article Duck.

Domestic Geese. The domestication of the goose was very easy and doubtless began as soon as men began to remain in fixed settlements. They are among the animals figured on the oldest Egyptian and Asiatic monuments, and the Oriental breeds were no doubt derived from local wild species, especially the great Chinese swan, or "guinea" goose (*Cygnopsis cygnoides*), whose true home is in the valley of the Amur River. This is the largest of living geese, and wild and domesticated specimens are freely crossed to this day with other breeds. The basis of the domestic geese of Europe, however, is the graylag above described; and this kind was imported by the early colonists to America, where some admixture has taken place with local wild geese. Formerly the cultivation of geese was more extensive and important than at present. Great herds of geese were annually driven slowly from western Europe to Rome, where both flesh and feathers (down) were in great demand. Previous to the invention of metallic pens goose quills supplied all the pens used and formed a large article of trade now almost obsolete. In southern England goose culture was formerly far more extensive than at present, many thousands being driven to market every fall; and goose fattening in Holland and Germany is still a great industry, especially in the neighborhood of Strassburg. The long domestication of geese, however, has brought about remarkably little variation. As is pointed out by Darwin in his *Animals and Plants under Domestication*, the change has been little more than a considerable increase in size and fecundity, and a tendency to lose the brownish tints of the wild stock and become spotted with white or altogether white. The last feature has resulted not only from a preference for pure white which has prevailed ever since the time of the Romans, but from the former cruel practice of plucking geese alive, the new feather produced by the injured skin being usually white.

The standard breeds commonly raised in the United States are gray Toulouse, white Embden, gray African, brown Chinese, white Chinese, gray Wild, and colored Egyptian. A number of crossbred geese have also given good results. In general Toulouse geese are more compact in form than are other breeds and for this reason are preferred by many. The head is rather large and short and the bill comparatively short. The neck is carried well up and is of medium length. The breast is broad and deep. The body of the Toulouse goose is moderate in length, broad, deep, and compact. In birds of good condition the belly almost touches the ground. The wings are large and strong, the tail comparatively short, the thighs and shanks stout. In color the plumage is gray. The standard weight of the adult gander is 20 pounds; adult goose, 20; young gander, 18; and young goose, 15 pounds. They are termed Christmas geese, since they mature later than others and are in season at the holiday time. They are fairly good layers, averaging 40 eggs in a season. See Colored Plate of Ducks.

White Embden geese are beautiful birds of large size, tall and erect carriage, snow-white plumage, and are about as heavy as the gray Toulouse goose. They originally came from Embden in Westphalia and have been bred in the United States for many years. They are considered a very satisfactory breed to raise. Gray African geese are by many considered the most profitable of all. They grow very rapidly and are ready for market in 10 weeks, weighing at that age between 8 and 10 pounds. According to standard weights they are as heavy as Tououse and Embden, but heavier specimens are not uncommon.

The brown and white Chinese geese are smaller than those previously mentioned, and probably for this reason less popular. The domesticated gray wild geese are satisfactory and are generally bred throughout the United States. They are very highly prized for table purposes, are good layers, hardy, and easy to raise. The standard weight of the adult gander is 16 pounds; adult goose, 14 pounds; young gander, 12 pounds; and young goose, 10 pounds.

The colored Egyptian geese are purely ornamental, being seldom bred for other purposes than the showroom. They are sometimes called Nile geese. They are tall and slender. The color of the head is black and gray; the bill is purple or bluish red, and the eyes orange. The neck and back are gray and black; the centre of the breast is chestnut, with the other part gray. The upper parts of the plumage of the body are gray and black, and the under parts are a pale yellow, penciled with black.

Breeding. Geese are long-lived birds, some having been known to attain the age of 40 years. Birds 15 and 20 years old are not uncommon. Mature geese, at least two years old, should always be used for breeding. Breeding stock should be pastured in the fall and later fed on grain with some beef scraps. Ten per cent of the ration should be green feed, stewed clover and cooked vegetables. The eggs may be hatched by hens or by geese. When goslings are four or five days old, they are able to take care of themselves, but should always be cooped at night. The first food of goslings is grass fed as sod, and a little corn meal sometimes mixed with a little sand and charcoal. Very soon they may be fed a mixture of ground grains, grass, and vegetable food. When young geese are fattened, they should be placed in a rather small pen, so that they may not exercise too much, and should be fed three times a day a mixture of corn meal and beef scraps. They should be kept as quiet as possible. At 10 weeks of age, or when the tips of the wings reach the tail, they should be ready for market. Geese require a wider range than do ducks and, unlike the latter, will not do well unless they have access to water.

Economic Uses. Geese are valuable for their feathers, quills, eggs, and as food. The flesh is most commonly roasted. It contains on an average some 18 per cent refuse (waste, bones, etc.) and 82 per cent edible portion. The edible portion has, on an average, the following percentage composition: water, 46.7; protein, 16.3; fat, 36.2; and ash, 0.8. Goose livers are esteemed a delicacy. The liver, morbidly enlarged by excessive feeding combined with lack of exercise, is used for making a delicately seasoned food called *pâté de foie gras,* for the manufacture of which Strassburg is especially famous. In Germany the breast is pickled and smoked under the name of Pomeranian goose breast. Goose fat is used to a large extent for culinary purposes, especially by Mohammedans and Jews. Consult Howard, "Ducks and Geese," in *United States Department of Agriculture, Farmers' Bulletin No. 64* (Washington, 1897).

GOOSE, Tailor's. A name applied to the smoothing iron used by tailors and supposed to have been given on account of the shape of the handle, which somewhat resembles the neck of a goose.

GOOSE BAR′NACLE. See Barnacle.

GOOSEBERRY, g͞ooz′bĕr-rĭ *or* g͞oos′-. The fruit of a prickly shrub of the genus *Ribes,* family Saxifragaceæ. The genus is common throughout the north temperate zone, being represented by numerous species in America, Europe, and Asia, the great majority of which belong to North America. Of all these only four or five species have attained prominence in cultivation. The currant (q.v.) (*Ribes rubrum*) is one of the most important representatives of the genus and carries its distribution into the Orient. In the gooseberry, however, we find a very popular shrub in both the New and the Old World; it is especially prized in England, where it has attained its highest perfection, and where it has been in cultivation from the sixteenth century. Since it occurs only sparingly in southern Europe, where the grape thrives so well, it is little wonder that the gooseberry was neglected by the Greeks and Romans, even if they were familiar with it. The European gooseberry (*Ribes grossularia*) is in its natural state a strong-growing upright shrub with very formidable spines upon the branches and a hairy, more or less spiny, fruit. It is the progenitor of all the mammoth-fruited varieties which have caused so much emulation among the gardeners of England, who have produced fruits weighing as much as 30 pennyweights; the unimproved fruits hardly average four pennyweights in weight. Varieties of this species were brought to America by the early pioneers, but the climate was uncongenial, and they suffered from disease and soon perished. Not until the middle of the nineteenth century could America claim to have a cultivated goose-

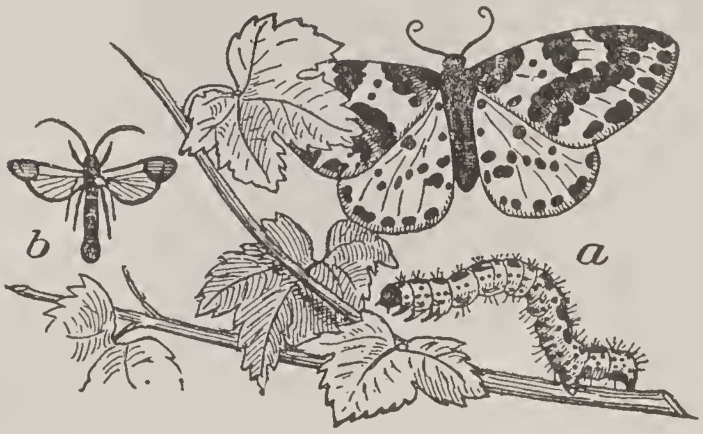
FRUITING TWIG OF GOOSEBERRY.

berry, and then only a seedling of one of the wild forms, *Ribes oxyacanthoides,* common throughout the country. This was Houghton's seedling, which, however, is not the most common wild species even at its place of origin (Massachusetts). It was soon followed by one of its own progeny, Downing's seedling, or Downing. The popularity and universal cultivation of these two, which are still in the lead, is due largely to their ability to resist mildew. With the advent of spraying to check plant diseases a new era opened for European gooseberries in America; and since 1890 the English varieties have been planted with more assurance of success. There are now numerous hybrids of the European with native species, which promise to combine the resistant characters of the latter with the desirable size, color, and form of the former.

The gooseberry is easily propagated by means of suckers, cuttings, and layers; cuttings are most frequently employed, as they grow readily and give a well-formed plant. The gooseberry thrives on all good arable soils and demands the same treatment as the currant. It is usually planted 3 by 6 feet apart in field culture, kept free from weeds, and sprayed with an arsenical poison early in the season to protect it from the worm which is as fond of it as it is of the currant. If the English varieties are grown, the poison must be supplemented with a fungicide. The fruits of the gooseberry are used extensively for jelly, jam, marmalade, etc., both in England and in America. The ripe fruits are also used to some extent in the manufacture of wines and vinegar.

Besides the two species above mentioned, the following species, being ornamental, should receive more attention than they do from horticulturists: the snow-flowered gooseberry (*Ribes niveum*), a native of the northwestern coast of America, is remarkable for its beautiful white pendulous flowers and its acid berries, which in size and color resemble black currants and which make delicious pies. *Ribes speciosum* is ornamental in pleasure grounds and is remarkable for its shining leaves, as well as for its flowers having four stamens, instead of five, as in other species, and for the great length of the filaments. *Ribes saxatile,* a native of Siberia, and other species, forming a subgenus called *Botrycarpum,* have a character somewhat intermediate between currants and gooseberries, being prickly shrubs, but having their flowers in racemes. *Ribes saxatile* has small, smooth, globose, dark-purple berries, like currants. Consult Card, *Bush Fruits* (New York, 1898).

GOOSEBERRY, Insects Injurious to the. The gooseberry is injuriously attacked by several borers, etc., harmful to currants. (See Currant Insects.) Two caterpillars, however, are especially harmful. The most prominent one in the Old World is the magpie moth (*Abraxas grossulariata*), closely related to the cankerworm, whose caterpillar is the worst enemy of the gooseberry in Europe. In the United States the most damage is done by the gooseberry fruitworm (*Dakruma convolutella*), the larva of a pyralid moth about an inch across the wings, which are "pale gray crossed near the base by a dark diffuse band which is divided by a whitish line." The eggs are laid by the female moths on the young fruit, one on each; and when the young hatch, they bore into the berry and feed on the pulp. The caterpillars are about an inch in length, pale green, with brownish heads. As they grow, they bind several berries together with silk. Finally they drop to the ground, form cocoons beneath the leaves, and spend the winter there in the pupa state, from which they emerge in the spring. The only practical and effective remedy seems to be to watch the bushes and pick off and destroy the reddish infected berries early in the season. The small clearwing (*Ægeria tipuliforme*) is also harmful in some places.



GOOSEBERRY INSECTS.

a, gooseberry moth (*Abraxas grossulariata*) and larva; *b,* currant borer, the clearwing (*Ægeria tipuliforme*).

GOOSE BIRD. A gunner's local name in the United States for the Hudsonian godwit (q.v.).

GOOSE′FISH. See Angler.

GOOSE FLOWER. See Aristolochia.

GOOSE′FOOT. See Chenopodium.

GOOSE GRASS, or Cleavers (*Galium aparine*). A coarse-stemmed annual species of bedstraw with whorls of six to eight leaves. The hispid stems, leaves, and fruit cling to clothing and to animals. A somewhat common species is *Galium tricorne,* introduced from Europe into a number of places in the United States. There are about 50 species in the United States, none of which are of much importance except as weeds. The name is also applied to some true grasses. See Eleusine; Bedstraw.

GOOSE HAWK. See Goshawk.

GOO′TOO (Jamaica negro). A name in Jamaica for various small globefishes (q.v.).

G. O. P. (Grand Old Party). A popular name for the Republican party (q.v.).

GO′PHER. A name of somewhat indefinite significance. It is a corruption of the French word *gauffre,* a honeycomb, applied by French settlers in America to burrowing animals which "honeycomb" the soil.

1. Any of several American rodents, belonging to two distinct families, the Geomyidæ and the Sciuridæ, subfamily Spermophilinæ. The true gophers belong to the first-mentioned family, the spermophiles being more properly ground squirrels (q.v.). The Geomyidæ are known as pouched rats, or pocket gophers. They are characterized by very large external cheek pouches which are lined with fur. These do not communicate with the mouth, but open beside it. In some species they run along the whole side of the neck as far back as the shoulders. These pouches seem to be used largely for carrying food. The front feet have large claws and are otherwise fitted for digging. The tail is short, and the ears are small. There are only two genera—*Geomys,* with perhaps half a dozen species, and *Thomomys,* with four or five smaller species. All of the pouched rats are confined to the western half of North America, except two species of *Geomys,* which occur in the Gulf

States, and they range from Central America northward to British Columbia. The most common species (*Geomys bursarius*) is found in Canada, Missouri, Illinois, Iowa, Texas, Mexico, and the Gulf States, but not north of the Saskatchewan River. It is about 9 inches long, with an almost hairless tail about 2 inches long, and weighs about 13 ounces. Its legs are short; forefeet strong and well adapted for burrowing, having five claws, the three middle ones very large and long. The claws on the hind feet are small, but the two middle ones longer than the others, the interior one being almost rudimentary. It has 20 teeth—8 upper and 8 lower molars, and 4 incisors, which are very strong, especially the lower pair, which are much stronger than the upper. The ears are very small. The animal is reddish brown on the back and sides, ashy beneath, and has white feet. It burrows in sandy soils, throwing up the earth in little mounds, and its work is surprisingly rapid and extensive. It subsists on grass, roots, nuts, buds, and farm vegetables. The roots of trees often suffer severely from its attacks. The pouches which cover the side of the head are capable of being so distended as to enable the animal to carry a considerable load of provisions. The true Southern gopher, or Georgia hamster (*Geomys tuza*), is a larger animal, found in Alabama, Georgia, and Florida. By a strange misapplication of names the gophers of the Southern States are often called "salamanders," although the latter word is almost universally applied to the tailed amphibians, and its use should properly be confined to that group. On the Pacific coast there are several kinds of gophers. Some are 6½ inches long, with a tail nearly 3 inches; cheek pouches large, resembling the thumb of a glove, hanging down by the side of the head. When in the act of emptying its pouches, the animal sits on its hams, like a marmot or squirrel, and squeezes the sacks against its breast with its chin and forepaws. All those not inhabiting warm climates hibernate. A familiar species in the Northwest is the camass rat (*Thomomys talpoides*).

Similar animals inhabit the plains of other parts of the world, as South Africa, Russia, Tartary, and India. Everywhere that civilization has caused a lessening of natural enemies, such as weasels, badgers, skunks, foxes, wolves, hawks, owls, serpents, and the like, these animals have increased to the proportions of a pest and must be combated by poison, by flooding their burrows, suffocating with sulphur fumes, or similar means; in view of which such native carnivorous animals and birds as the coyote, badger, skunk, ferret, and all the hawks and owls should be preserved to the limits of toleration as assistants in keeping down these and other harmful rodents, such as the mice. See accompanying Plate and article POCKET GOPHER for illustrations of skull, face, and claws. Consult: Coues, *Geomys and Thomomys* (Washington, 1875); Merriam, *Monographic Revision of the Pocket Gophers* (Washington, 1895); Herrick, *The Mammals of Minnesota* (Minneapolis, 1892); Seton, *Life-Histories of Northern Animals* (New York, 1909).

2. A tortoise. See GOPHER TORTOISE.

3. A serpent. See GOPHER SNAKE.

GOPHER SNAKE (so called because it burrows like a gopher), or INDIGO SNAKE. A large colubrine serpent (*Compsosoma*, or *Spilotes, corais couperi*) of the southern United States, 10 feet in length, black, with reddish markings about the mouth and forward part of the belly. It is regarded by the negroes as a mortal enemy of the rattlesnake (see KING SNAKE) and is rarely molested by them. This variety passes into a variety (*melanurus*) of Mexico and Central America, and that into the typical *Compsosoma corais* of South America, which is light brown, with a black oblique stripe on each side of the neck.

GOPHER STATE. Minnesota. See STATES, POPULAR NAMES OF.

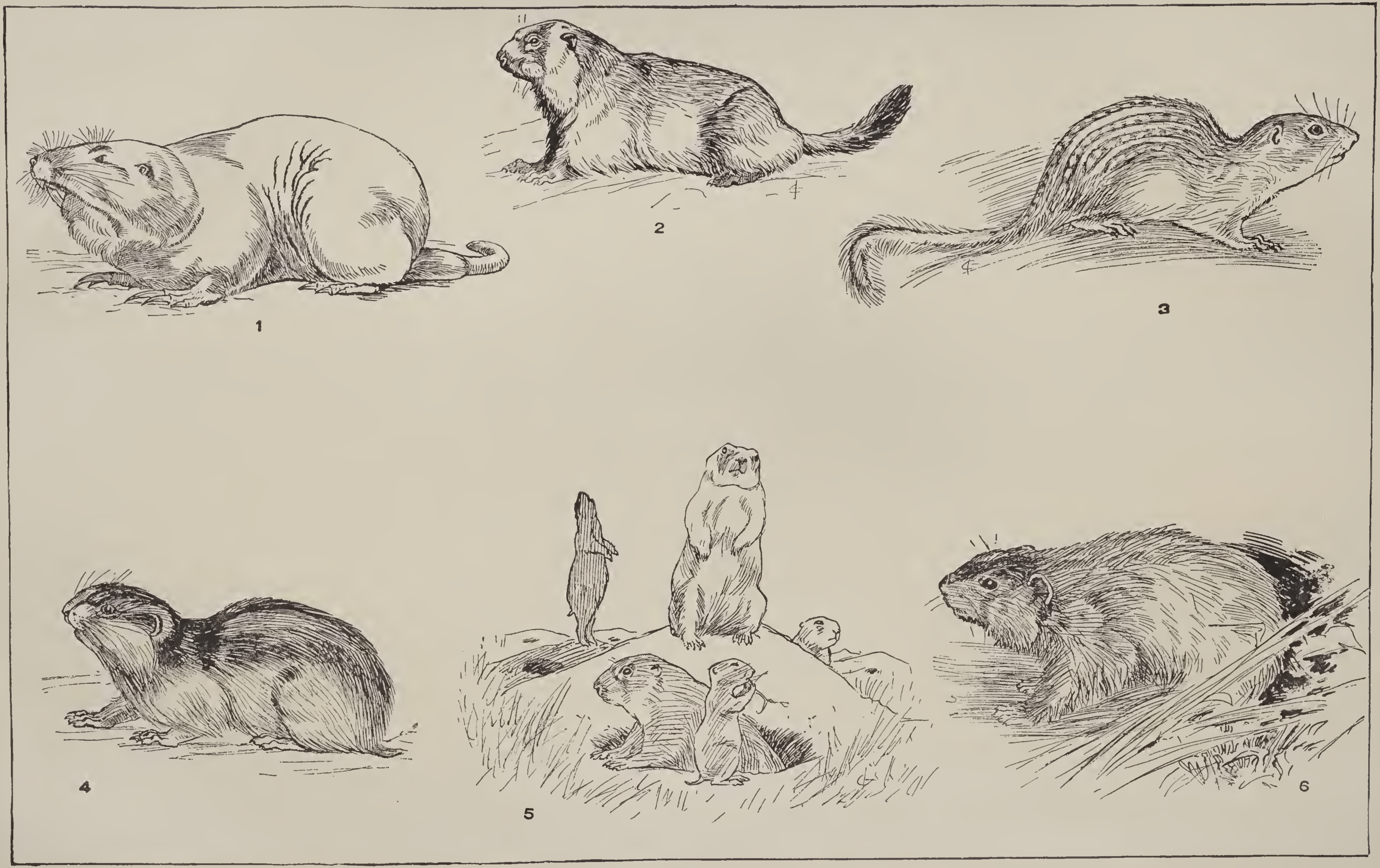
GOPHER TORTOISE. A turtle (*Xerobates* or *Testudo, polyphemus*) of the sandy coast districts of the southern United States. The shell, brown and black above and yellow below, measures 15 inches in length, the females being larger than the males. These tortoises are strong animals, burrowing deeply into the soil, where they pass the hot part of the day in pairs and hibernate in winter, and whence they come out at night in search of vegetable food. They are numerous and somewhat gregarious, especially in Florida, and do much damage in gardens and among root crops. The rural negroes seek them for food and also search for their buried eggs, which are as large as the eggs of a pigeon and five in number. The animal is thus an important food resource in Florida, where it is captured largely in pit traps. Other similar species inhabit the southwestern Territories and northern Mexico.

GOPHER WOOD. The wood of which Noah's ark was made (Gen. vi. 14). The word occurs only in this passage, is not found in the Semitic languages other than Hebrew, and its true meaning is not known. It has been conjectured to be akin to the Hebrew *kopher* (bitumen) or *gophrith* (pitch), to be a resinous wood like the cedar or the cypress, or to correspond to the Assyrian *giparu* (reed). If the last meaning is accepted, it is well to remember that the kufa now in use on the rivers and canals of Babylonia are made of willow branches, palm leaves etc., closely interwoven like basketwork, with a coat of bitumen on the inside.

GÖPPERT, gẽ′pĕrt, HEINRICH ROBERT (1800–84). A German paleontologist and botanist, born at Sprottau and educated at Breslau and Berlin. He was teacher at the Medico-Chirurgical Institute in 1827–30 and in 1831 became professor of botany at the University of Breslau. During the last 31 years of his life he was director of the botanical garden of Breslau. Besides his important compilation and classification of all fossilized plants known before 1850 in Brown's *Index Palæontologicus* (1848–50), he wrote a very large number of works, chiefly on vegetable physiology and phytopaleontology. Among these are: *Die fossilen Koniferen verglichen mit denen der Jetztwelt*, with 58 plates (1850); *Skizzen zur Kenntnis der Urwälder Böhmens und Schlesiens* (1868); *Ueber die fossile Flora der silurischen, devonischen, und untern Kohlenformation* (1860); *Die Flora des Bernsteins* (1883).

GÖPPINGEN, gẽ′pĭng-en. A town of the Kingdom of Württemberg, Germany, situated, 1030 feet above sea level, on the Fils, 26 miles by rail from Stuttgart (Map: Germany, C 4). It has an old castle, built in the sixteenth century. The town is an important industrial centre with manufactures of cloth, leather,

GOPHERS LEMMINGS AND MARMOTS



1. POUCHED GOPHER (Geomys bursarius).
2. ALPINE MARMOT (Marmota marmota).
3. STRIPED GROUND SQUIRREL or GOPHER (Spermophilus tridecemlineatus).
4. LEMMING (Lemmus lemmus).
5. PRAIRIE DOG (Cynomys ludovicianus).
6. WOODCHUCK (Arctomys monax).

enameled ware, toys, agricultural machinery, wire netting, shoes, paper, hats, gelatine, chemicals, bricks, textiles, and glue. Pop., 1900, 19,384; 1910, 22,373.

GO'PURA, or **GO'PURAM** (Skt. *gópura*, a city gate). In Hindu architecture, a towerlike structure erected over the gateway of a temple. The term is used almost exclusively of the Dravidian temple gateways of southern India (see Dravidian Architecture). These sustain lofty pylons built in successively retreating stories decorated with an extraordinary complexity of architectural embellishments and figure sculpture. They have no utilitarian function. Some of the great temples have not only a gopura over each of the four gates to the outer wall, but gopuras also over the gateways of successive inner enclosures. That at Srirangam has twelve; that at Tiruvaleer nine. The unfinished gopura in front of the *choultrie* of Tirumulla Nayab at Madura measures 107 by 174 feet on the ground; the gateway is 57 feet high, and the structure, if completed, would have been probably over 300 feet high. The *gopuras* should not be confounded with the pagodas, sikhras and vimanas, which are tower-like shrines or parts of the temple proper. See Indian Art, *Architecture.* Consult Fergusson, *Indian and Eastern Architecture* (London, 1891).

GORAKHPUR, gō'rŭk-po͞or'. A division of the United Provinces of Agra and Oudh, British India, bounded on the north by Nepal and on the south by the Gogra River. Area of division, 9543 square miles. Pop., 1891, 6,508,800; 1911, 6,524,419. It comprises the three districts of Gorakhpur, Basti, and Azangarh, and lies immediately south of the lower Himalayan slopes. It is intersected by numerous rivers and lakes well stocked with fish. In the north and centre dense forests abound, and the whole country presents a verdant appearance. The principal rivers are the Rapti, the Gogra, and the Great and Little Gandak. The tiger is found in the north, and many other wild animals abound. The chief productions are cotton, rice, bajra, joāh, moth, etc. Capital, Gorakhpur (q.v.). Gautama Buddha, the founder of Buddhism, died within the District of Gorakhpur, and it became the headquarters of the new creed. The district formed part of the territory ceded by Oudh to the British under the Treaty of 1801. During the mutiny of 1857 it was lost for a short time, but under the friendly Gurkhas the rebels were driven out, and the whole district once more passed under British rule.

GORAKHPUR. The capital of a district and division of the United Provinces of Agra and Oudh, British India, on the Rapti River, 100 miles northeast of Benares (Map: India, E 3). Its principal edifice is a beautiful mosque, built in the seventeenth century. A considerable river transit trade in grain and timber is carried on. Gorakhpur was formerly an important military station, but the troops have been moved, and the large cantonment on the west of the city is abandoned. Pop., 1901, 64,148; 1911, 56,892.

GO'RAL (East Indian). A goat antelope (q.v.) of the genus *Cemas*, inhabiting the mountain tops of Central Asia. Three species are separated by zoölogists, but those of Tibet and Mongolia are so little known that they may prove only varieties of Himalayan goral (*Cemas goral*). This antelope-like animal stands only 27 inches high and is grayish brown, with a dark stripe along the back and another down the foreleg, and a curious white ring around the eye; the forehead, nose, and tail are black. Both sexes have short black horns curving backward and ringed near the base. They wander in small bands about the edge of the highest forest and are exceedingly vigilant and agile, so that goral stalking is a laborious and skillful as well as delightful pursuit for the sportsman. See Serow, and Plate of Goat Antelopes.

GORAMI, gō'rȧ-mĭ. See Gourami.

GOR'BODUC. A legendary King of Britain, who is mentioned in the early chronicles, and whose tragic fate, together with that of his sons, forms the plot of the first English tragedy. The play was written by Thomas Norton and Thomas Sackville, was acted in 1561, and was printed in 1565. It has been highly praised by Sidney and Pope, but is rather too sanguinary for modern audiences. It goes by the name of its hero, who has divided his possessions between his two sons, Ferrex and Porrex. The sons quarrel, and one is slain; the survivor is slain by his mother, who in turn is killed with her husband by an indignant populace.

GORBUSCHA, gôr-bo͞o'shȧ. The humpbacked salmon (*Oncorhynchus gorbuscha*). See Salmon; Humpbacked Salmon.

GORCO'MIUM. See Gorkum.

GOR'CUM. See Gorkum.

GOR'DAN, Paul Albert (1837–1912). A German mathematician, born at Breslau. He studied at various German universities and in 1862 received his doctor's degree from the University of Berlin. He became a lecturer at the University of Giessen in 1863 and professor in 1865. After 1875 he held a professorship at the University of Erlangen. Gordan was one of the chief workers in the theory of invariants. He coöperated with Alfred Clebsch in much of his work and was a collaborator on the *Mathematische Annalen* after 1873. His proof of the finiteness of the invariant system of binary forms (first published in 1869) was a very important contribution to the upbuilding of the theory of modern algebra. His publications include: *Ueber die Transformation der Theta Funktionen* (1863); *Theorie der Abel'schen Funktionen,* with Clebsch (1866); *Ueber das Formensystem binärer Formen* (1875); *Vorlesungen über invarianten Theorie* (2 parts, 1885–87); and some 80 papers in mathematical journals.

GOR'DIAN. The English form of the name of three Roman emperors. See Gordianus.

GOR'DIAN KNOT (Lat. *Gordius nodus*). The traditional origin of this famous knot was as follows: Gordius, a Phrygian peasant, was once plowing in his fields, when an eagle settled on his yoke of oxen. Surprised at so wonderful a phenomenon, he sought an explanation of it and was informed by a prophetess of Telmissus that he should offer sacrifice to Zeus. He did so, and out of gratitude for the kindness shown to him married the prophetess, by whom he had a son, the famous Midas. Somewhat later, in consequence of factional quarrels, the Phrygians consulted an oracle concerning the choice of a king. In reply they were ordered to choose as king whoever should first come to them riding in a car. As Gordius and his family came to the assembly while the reply was under discussion, he was at once chosen king, or, according to another version, his son Midas became ruler. Gordius dedicated his car and yoke to

Zeus, in the acropolis of Gordium (a city named after himself, in Phrygia, on the road between Pessinus and Ancyra, near the river Sangarius); the knot of the yoke was tied in so skillful a manner that an oracle declared that whoever should unloose it would be ruler of all Asia. When Alexander the Great came to Gordium, he cut the knot in two with his sword and applied the prophecy to himself.

GOR′DIA′NUS. The name of three Roman emperors, father, son, and grandson.—The first, MARCUS ANTONIUS GORDIANUS SEMPRONIANUS, surnamed AFRICANUS (c.158–238 A.D.), was descended on the father's side from the famous family of the Gracchi. He was remarkable for his attachment to literary pursuits. After being ædile, in which capacity he celebrated the gladiatorial sports with great magnificence, he twice filled the office of consul—first as the colleague of Caracalla in 213 A.D., and later as the colleague of Alexander Severus. Soon afterward Alexander Severus appointed him proconsul of Africa, where he gained the affection and esteem of the people. The tyranny and injustice of the Emperor Maximinus having at length excited a rebellion against his authority in Africa, the Imperial procurator there was murdered by a band of nobles who had formed a conspiracy against him on account of his cruelty. Gordianus, now in his eightieth year, was proclaimed Emperor after having vainly refused the dangerous honor (March 16, 238 A.D.). He received the title of Africanus, and his son was associated with him in the exercise of Imperial authority. The Roman Senate acknowledged both and proclaimed Maximinus, then absent in Pannonia, an enemy to his country. The younger Gordianus, however, was defeated and slain in battle by Capellianus, Governor of Numidia, before Carthage, and his father in an agony of grief put an end to his own existence, having been Emperor for little more than a month. In personal appearance the elder Gordianus is said to have greatly resembled Augustus.—MARCUS ANTONIUS GORDIANUS (192–238), commonly called GORDIANUS PIUS, Emperor 238–244 A.D., grandson of the older Gordianus, was raised to the dignity of Cæsar along with Pupienus Maximus and Balbinus, who were also proclaimed emperors in opposition to Maximinus; and in the same year, after Pupienus, Balbinus, and Maximinus had fallen by the hands of their own soldiers, Gordianus was elevated by the prætorian guards to the rank of Augustus. Assisted by his father-in-law, Misitheus, a man distinguished for his wisdom, virtue, and courage, whom he made prefect of the prætorians, he marched, in the year 242, into Asia, against the Persians, who under Shahpur (Sapor) had taken possession of Mesopotamia and had advanced into Syria. Antioch, which was threatened by them, was relieved by Gordianus, the Persians were obliged to withdraw from Syria beyond the Euphrates, and Gordianus was just about to march into their country when Misitheus died. Philip the Arabian, who succeeded Misitheus, stirred up dissatisfaction in the army against Gordianus by treachery and finally goaded on the soldiery to assassinate the Emperor, 244 A.D.

GORDIN, gôr′dyĕn, JACOB M. (1853–1909). A Jewish playwright and journalist, born in the Government of Poltava, Russia. He was privately educated and after a number of years spent in teaching began to write short stories and general articles for newspapers in St. Petersburg and Odessa. From 1886 to 1890 he was the editor of various publications at Odessa and Yelizavetgrad. In 1879 he founded at Yelizavetgrad the Society of Spiritual Brethren of the Bible, whose aim was to reconstruct religion upon the sole basis of practical ethics, to the exclusion of all rites and ceremonies. In 1890 the society was suppressed by the Russian government, and Gordin came to New York, where he began almost immediately to write for the Yiddish stage, his first play, *Siberia,* appearing in November, 1891. Within the next 15 years he had produced about 60 plays, varying greatly in quality, among them many adaptations and translations, dealing for the most part with Jewish life in Russia and America. His adaptations are such in the sense only that the general outline of their plot is borrowed; the details of the action, the character drawing, and the underlying meaning of the play are most often original. *Gott, Mensch und Teufel,* one of his best plays, is the Job or Faust motive worked out in modern Jewish life, and in the same category are *Der jüdische König Lear, Die jüdische Sappho,* and *Kreutzer Sonata.* The last was produced in an English version in 1905–06. His plays are robustly realistic, but the ethical import is prominent. Others of his successful dramatic works are: *Mirele Efroth; Der wilde Mensch; Die Schechita* (The Sacrifice); *Die Schb'uo* (The Vow); *Medea; Schlome Chacham, Der russische Jude in Amerika.* Consult Hapgood, *The Spirit of the Ghetto* (New York, 1902).

GOR′DIUM. See GORDIAN KNOT.

GOR′DIUS (Lat., Gordian, sc. *nodus,* knot; so called from the intricate knots into which the animals twist). The type genus of the Gordioidea, second order of Nematoda (q.v.), including those nematodes in which the body cavity is lined by a distinct epithelium. See HAIRWORM.

GORDIUS. See GORDIAN KNOT.

GOR′DON, THE FAMILY OF. A famous Scottish family. In 1305 Sir ADAM OF GORDON was a partisan of Edward I in his struggle for the Scottish throne. He was named joint justiciar of Lothian and was one of the representatives of Scotland in the Parliament of Westminster. Nevertheless, he was pardoned by Robert Bruce and given the lordship of Strathbogie, where the chief seat of the family henceforth lay. His descendant, Sir ADAM, fell at the battle of Homildon Hill, in 1402, and with him the direct male line ended. The name "Gordon" was, however, transmitted by his two half brothers to a wide circle of gentry in Mar, Buchan, and Strathbogie.

ELIZABETH OF GORDON, the only daughter and heiress of Sir Adam, married Alexander Seton, who afterward was given the title of Lord Gordon. Her son ALEXANDER assumed the family name of Gordon and was made Earl of Huntly in 1449 and Lord of Badenoch soon afterward. By marriage he acquired large possessions in Aberdeenshire. Her son GEORGE, second Earl of Huntly, married Annabella, daughter of James I, and was Chancellor of Scotland from 1498 to 1501. His son ALEXANDER commanded the left wing of the Scottish army at Flodden Field. The landed possessions of the family were greatly increased by this royal marriage, especially in Banffshire and Inverness-shire. GEORGE, fourth Earl of Huntly, acquired the earldom of Moray, and held the offices of Lieutenant of the North and Chancellor of the Realm. Alarmed at his power, the crown deprived him of Moray. The Earl rebelled, and lost his life by a wound in 1562. His grandson George, the fifth Earl (see Huntly, George Gordon), headed the Catholic party in Scotland and defeated at Glenlivet a royal army sent against him in 1594. Nevertheless, he obtained a pardon and was made Marquis of Huntly. George, his successor, fought for Charles I in the Civil War and was beheaded at Edinburgh in 1649. His grandson, George, first Duke of Gordon (1684), held Edinburgh Castle for James II in the revolution of 1688. His son was the last Catholic chief of the race, while his great-grandson, Lord George Gordon (q.v.), was leader of the Gordon Riots of 1780 in London, directed against the Catholics. In 1836 the title became extinct, but it was revived in 1876 for the benefit of the Duke of Richmond.

Descendants of the first Marquis of Huntly became viscounts of Melgund and of Aboyne and finally inherited the marquisate of Huntly, which they still hold. Other members of the family became earls of Sutherland. The lords of Lochinvar, famous in poetry and song, were Gordons. One of them, William, sixth Viscount of Kenmure, was beheaded in 1716 for his prominent part in the Jacobite rising. In 1682 Sir George Gordon of Haddo, Lord Chancellor of Scotland, was made Earl of Aberdeen. Other members of the family were Lord Byron, whose mother was a Gordon, and Charles George Gordon, the hero of Khartum.

Consult: Douglas, *The Baronage of Scotland* (Edinburgh, 1813); W. Gordon, *The History of the Ancient, Noble, and Illustrious House of Gordon* (ib., 1726–27); *The House of Gordon*, ed. by J. M. Bulloch (Aberdeen, 1903–12); Bulloch, *The Families of Gordon of Invergordon, Newhall, also Ardoch, Ross-shire and Carroll, Sutherland* (ib., 1906); id., *The First Duke of Gordon* (ib., 1909), *The Gay Gordons* (London, 1908).

GORDON, Adam Lindsay (1833–70). An Australian poet. He was born at Fayal in the Azores and was educated at Cheltenham College, and at Merton College, Oxford. In 1853 he emigrated to South Australia, where he became a trooper in the mounted police and later a horse breaker. In 1865 he was elected a member of the House Assembly for the District of Victoria. He became known as an expert steeplechase rider, opened a livery stable at Ballarat, Victoria, in 1867, and in 1869 moved to Melbourne. His writings were little known during his life, but after his death—he committed suicide—his reputation increased until he became the most popular of Australian poets. His volumes of verse include: *Sea Spray and Smoke Drift* (1867); *Ashtaroth: A Dramatic Lyric* (1867); *Bush Ballads and Galloping Rhymes* (1870). Consult Marcus Clarke's biographical sketch in his edition of Gordon's poems (1880), and also J. H. Ross, *The Laureate of the Centaurs: A Memoir of Adam Lindsay Gordon* (1888). His poems, ed. by Douglas Sladen, appeared in London in 1912. See Australian Literature.

GORDON, Charles George (1833–85). An English soldier, familiarly known as "Chinese Gordon" and "Gordon Pasha." The son of Henry William Gordon, lieutenant general of artillery, he was born at Woolwich, Jan. 28, 1833. He was educated at Taunton, and entered the Royal Military Academy at Woolwich in 1848. Obtaining a lieutenant's commission in 1852, he served through the Crimean War with distinction. From 1856 to 1858 he was employed in surveying and settling the Russo-Turkish frontier in Asia and acquired an intimate knowledge of the people and the districts he visited. He was promoted captain, 1859, in 1860 joined the Anglo-French forces in China and was present at the capture of Peking. He remained at Tien-tsin in command of the royal engineers; he added to the geographical knowledge of China by several expeditions to the unknown interior, in 1862 became major, and in 1863 was appointed commander of the "Ever Victorious Army," which suppressed the formidable Taiping rebellion and opened up the rich provinces and cities of the silk districts. He refused the large money rewards offered him by the Chinese Emperor, who bestowed upon him the yellow jacket and peacock's feather of a mandarin of the first class, with the gold medal and title of Ti Tu, the highest Chinese military rank. In 1864 he received his brevet as lieutenant colonel, and on his return to England was made a C.B. From 1865 to 1871 he commanded at Gravesend the royal engineers, who were employed in constructing forts for the defense of the Thames, and was distinguished for his charitable work among the sick and poor. From 1871 to 1873 he represented England in the International Danube Commission at Galatz. In 1874 he was sent by Ismail Pasha to establish the authority of Egypt in the upper Nile basin, and was appointed Governor of the Equatorial Provinces. Subsequently he was created a pasha, and in February, 1877, the Khedive appointed him Governor of the Sudan. His administration was marked by wonderful energy and activity in establishing communication between widely separated districts, in the development of the natural resources of the country, and in suppressing rebellion and slavery. The deposition of Ismail in 1879 led to his resignation. In 1880 he accompanied the Marquis of Ripon to India as his private secretary, but, finding himself unsuited for the post, at once resigned, and on the invitation of Sir Robert Hart visited China to advise the government in connection with its strained relations with Russia.

In 1881–82 he commanded the royal engineers in Mauritius, where he attained the rank of major general. From March to October, 1882, he was connected with the Cape government in an attempt to terminate the Basuto trouble, but resigned in indignation at the intrigues of Mr. Sauer, Secretary for Native Affairs. The year 1883 he spent in a long-desired visit to the Holy Land. He had undertaken a mission to the Congo for the King of the Belgians when the catastrophe to Hicks Pasha's army, which was overwhelmed by the forces of the Mahdi, made the Gladstone government insist on the Khedive's abandonment of the Sudan. Gordon was commissioned to effect the withdrawal of the scattered garrisons and the evacuation of the country. He arrived at Khartum in 1884 and received a warm welcome; but his first battle with the hostile Sudanese was unsuccessful, owing to the treachery of two pashas, whom he at once sentenced to death. The capture of Berber by the rebels cut Gordon's communications with Cairo, and he was beleaguered in Khartum. By vigorous personal effort he successfully repelled the besieging hordes for over 10 months, but on

Jan. 26, 1885, when a tardily dispatched British army of relief, under General Wolseley, had arrived within two days' march of the place, Khartum fell through the treachery of Ferig Pasha, and the heroic commander was slain. Gordon's writings include: *Reflections in Palestine* (1884); *Last Journal* (1885); *Letters to his Sister* (1888). Consult: Andrew Wilson, *Ever Victorious Army* (London, 1868); Hill, *Gordon in Central Africa* (ib., 1881); Hake, *The Story of Chinese Gordon* (ib., 1884–85); and the various *Lives* by Archibald Forbes (ib., 1884), by his brother, Sir Henry Gordon (ib., 1886); Sir W. F. Butler (ib., 1899); D. Boulger (ib., 1911); W. S. Blunt, *Gordon at Khartoum* (ib., 1911); and the books on the *Egyptian Sudan*, by Ohrwalder (trans., ib., 1892) and Slatin Pasha (trans., ib., 1896).

GORDON, Charles William (1860–). A Canadian author. He was born in the County of Glengarry, Ontario, graduated at Toronto University, and studied theology at Knox College. He was ordained to the Presbyterian ministry in 1890. In the same year he went as a missionary to the Canadian Northwest Territories, where he worked among the miners and lumbermen for three years, and afterward succeeded in securing the help of Presbyterian churches in Great Britain in furtherance of Canadian missions. In 1894 he was appointed pastor of St. Stephen's Presbyterian Church at Winnipeg. All his writings were published under the nom de plume of "Ralph Connor." Gordon was elected vice president of the Canadian Society of Authors, and a fellow of the Royal Society of Canada. In 1911 he was chairman of the board of arbitration in the British Columbia and Alberta mines dispute. His works, several of which created a sensation, include: *Beyond the Marshes* (1897); *Black Rock* (1898); *The Sky Pilot* (1899); *The Man from Glengarry* (1901); *Glengarry School Days* (1902); *The Swan Creek Blizzard* (1904); *The Prospector* (1904); *Breaking the Record* (1904); *The Doctor: A Tale of the Rockies* (1906); *The Angel and the Star*, sermons (1908); *The Life of the Late Rev. Dr. James Robertson* (1908); *The Dawn by Galilee* (1909); *The Foreigner* (1909); *The Recall of Love* (1910); *Corporal Cameron of the Northwest Mounted Police* (1912). Consult "English-Canadian Literature," by Thomas Guthrie Marquis, in *Canada and its Provinces*, vol. vi (Toronto, 1913–14).

GORDON, Daniel Miner (1845–). A Canadian educator. He was born in Pictou, Nova Scotia, and was educated at Glasgow and Berlin universities. Ordained to the Presbyterian ministry in 1866, he was minister of St. Paul's Church, Truro, Nova Scotia (1866–67); St. Andrew's Church, Ottawa, Ontario (1867–82); Knox Church, Winnipeg, Manitoba (1882–87); and St. Andrew's Church, Halifax (1887–94). In 1894–1902 he was professor of systematic theology in the Presbyterian College, Halifax; and in 1902 he became principal and vice chancellor of Queen's University, Kingston, Ontario. Long and actively interested in promoting the union of the Presbyterian churches in Canada, Gordon was a delegate to the General Assembly of the Church of Scotland in 1875, in 1906 was appointed a member of the committee on union of the Presbyterian, Methodist, and Congregational churches of Canada, was elected vice president of the Lord's Day Alliance, and in 1910 was a delegate to the World's Missionary Convention at Edinburgh. He published *Mountain and Prairie* (1880), the narrative of a journey made by him in 1879 from Victoria, British Columbia, to Winnipeg.

GORDON, George, Lord (1751–93). An English agitator whose name is connected with the "No Popery" riots in London in 1780. He was the third son of Cosmo George, third Duke of Gordon. He was born Dec. 26, 1751, and at an early age entered the navy, and rose to the rank of lieutenant, but quitted the service during the American War because Lord Sandwich refused him a ship. Elected in 1774 member of Parliament for Ludgershall, a pocket borough, he soon made himself conspicuous by his opposition to ministers and by the freedom with which he attacked all parties; but, though eccentric, he displayed considerable talent in debate and no little wit. When in 1778 a bill passed the Parliament for the relief of Roman Catholics from certain penalties and disabilities, the Protestant Association of London, among other societies, was formed for the purpose of procuring its repeal, and in November, 1779, Gordon was elected president. In June, 1780, he headed a mob of about 100,000 persons in a procession to the House of Commons to present a petition against the measure. Riots ensued in the city, lasting for several days, in the course of which many Catholic chapels and private dwelling houses, Newgate and other prisons, and the mansion of the Chief Justice, Lord Mansfield, were destroyed, and in the suppression of the disturbance by military force nearly 500 lives were lost. A vivid description of the riots will be found in Dickens's *Barnaby Rudge.* Gordon was tried for high treason, but acquitted. Thereafter he seemed insane. In 1786 he was excommunicated by the Archbishop of Canterbury for refusing to give evidence in a will case, and later he became a convert to Judaism. In 1787 he was convicted on two official informations—for a pamphlet reflecting on the laws and criminal justice of the country and for publishing a libel on Marie Antoinette, then Queen of France. While in prison at Newgate, he died of a fever on Nov. 1, 1793. In addition to the histories of England, consult: O'Beirne, *Considerations on the Late Disturbances, by a Consistent Whig* (London, 1780); Vincent, *A Plain and Succinct Narrative of the Riots in the Cities of London and Westminster and Borough of Southwark* (3d ed., ib., 1780); Watson, *Life of Lord George Gordon* (ib., 1795); Wemyss, *A Notable Woman and Other Sketches* (ib., 1893); Cobbett, *State Trials*, xxi; *Annual Register* for 1780, 1784, 1787.

GORDON, George, fifth Earl of Huntly. See Huntly.

GORDON, George Angier (1853–). An American Congregational clergyman, born in Aberdeenshire, Scotland. He came to America when but 18 years old and three years afterward entered the Bangor Theological Seminary, where he graduated in 1877. He preached for one year at Temple, Me., took a special course in Harvard College, and after his graduation in 1881 was for three years pastor at Greenwich, Conn., and in 1884 became pastor of the Old South Church in Boston. He was a university preacher at Harvard University from 1886 to 1890 and at Yale from 1888 to 1901. In 1897 he became an overseer of Harvard. In 1893 he received the degree of D.D. from Bowdoin and from Yale, and the degree of S.T.D. in 1895 from Harvard and in 1903 from Columbia. His publications include: *The Witness to Immortality* (1893); *The Christ of To-Day* (1895); *Immortality and the New Theology* (1897); *The New Epoch for Faith* (1901); *Ultimate Conceptions of Faith* (1903); *Through Man to God* (1906); *Religion and Miracle* (1909; rev. ed., 1910); *Revelation and the Ideal* (1913).

GORDON, George Hamilton, fourth Earl of Aberdeen. See Aberdeen.

GORDON, George Henry (1823–86). An American soldier. He was born in Charlestown, Mass., graduated at West Point in 1846, and served in the southern campaign in the Mexican War, earning the brevet of first lieutenant. In 1854 he resigned from the service, and from 1854 to 1861, after taking a course in the Harvard Law School, practiced law in Boston. On the outbreak of the Civil War in 1861 he organized and became colonel of the Second Massachusetts Volunteers. Largely in recognition of his skill and bravery in covering the retreat of General Banks's army from Strasburg to Winchester, Va., on May 24–25, 1862, he was promoted to be a brigadier general of volunteers in June, 1862, and served as such at Cedar Mountain, Chantilly, South Mountain, and Antietam. From March to June, 1865, he was in command of the Eastern District of Virginia, and on April 9, 1865, was brevetted major general of volunteers. On Aug. 24, 1865, he was mustered out of service and subsequently until his death practiced law in Boston, where for some time he also acted as collector of internal revenue for the Seventh Massachusetts District. He published: *History of the Second Massachusetts Regiment* (1876); *History of the Campaign of the Army of Virginia under Gen. John Pope from Cedar Mountain to Alexandria* (1880); *A War Diary of the Events of the War of the Great Rebellion, 1863–65* (1882); *Brook Farm to Cedar Mountain, 1861–62* (1883).

GORDON, Sir James Alexander (1782–1869). An English naval officer, born in Aberdeenshire. He entered the navy at the age of 11, served in the engagement off L'Orient in June, 1795, and in the battles of Cape St. Vincent and the Nile. In 1804 he was placed in command of the sloop *Raccoon,* subsequently participated in various actions in the West Indies, the Mediterranean, and the Adriatic, and particularly distinguished himself in the battle of Lissa, March 13, 1811, in which he commanded the frigate *Active.* In November, 1811, he lost a leg at the capture of the French frigate *La Pomone.* As commander of the *Sea Horse,* he joined Sir Alexander Cochrane in the Chesapeake in the fall of 1813 and subsequently commanded the squadron which, in August, 1814, entered the Potomac, reduced Fort Washington, and captured Alexandria, after destroying or capturing the vessels in the harbor. He also took part in the futile expeditions against New Orleans in 1814–15. Subsequently he was superintendent of Plymouth Hospital (1828–32), superintendent of Chatham Dockyard (1832–37), lieutenant governor of Greenwich Hospital (1840–53), and governor of that hospital from 1853 until his death (Jan. 8, 1869). He was made a vice admiral in 1848, admiral in 1855, and admiral of the fleet in 1868.

GORDON, John. A Scottish soldier of fortune of the seventeenth century. He entered the Imperial army of Ferdinand II during the Thirty Years' War and rose to the rank of lieutenant colonel and commandant of Eger. Upon hearing of the defection of Wallenstein, commander in chief of the Imperial forces, and the determination of that general to form an alliance with the Swedes, Gordon joined in the conspiracy with Butler and Leslie for the murder of Wallenstein and his most trusted adherents. In compensation for his services he received a considerable sum from the Imperial government. Gordon is one of the characters in Schiller's tragedy, *Wallenstein.*

GORDON, John Brown (1832–1904). An American soldier and politician. He was born in Upson Co., Ga., graduated at the State University in 1852, and followed the profession of law. In 1861 he entered the Confederate army as captain of infantry and rose to the grade of lieutenant general, being wounded five times. At the time of General Lee's surrender at Appomattox, General Gordon commanded one wing of the army. In 1868 he was the Democratic candidate for Governor of Georgia, but General Meade, military commander under the Reconstruction Act, declared his opponent, Rufus B. Bullock, elected. He defended his State in the Ku-Klux investigations, was elected to the United States Senate in 1873, reëlected in 1879, and resigned in 1880. He was again elected in 1891, and was one of the leaders of the Democratic party. From 1887 to 1890 he was Governor of Georgia. He became well known as a lecturer on Civil War subjects, and for a number of years held the post of commander in chief of the United Confederate Veterans. He wrote *Reminiscences of the Civil War* (1905).

GORDON, Sir John Campbell, seventh Earl of Aberdeen. See Aberdeen.

GORDON, Sir John Watson- (1788–1864). A Scottish portrait painter. He was born at Edinburgh, the son of Capt. James Watson of the Royal Artillery, and afterward added Gordon to his family name. He studied for four years under John Graham at the Trustees' Academy and frequented the studio of his uncle and Sir Henry Raeburn. After the death of Raeburn he became the principal portrait painter in Scotland. In 1850 he succeeded Sir William Allan as president of the Royal Scottish Academy, was appointed limner to the Queen, and received knighthood. Gordon excelled in transferring to the canvas those lineaments of character which are conceived to be preëminently Scottish. Among his best-known works may be mentioned: "Sir Walter Scott" (1831); "Dr. Chalmers" (1837); "Duke of Buccleuch" (1842); "Lord Cockburn" (1842); "Thomas De Quincey" (1843, National Portrait Gallery, London); "Lord Robertson" (1846); "Principal Lee" (1847); "Professor Wilson" (1851); "Earl of Aberdeen" (1852); and the "Provost of Peterhead" (1853), which received a gold medal at the Paris Exposition in 1855.

GORDON, Judah Loeb or Leon (1830–92). A Russian Hebrew writer. He was born and educated at Vilna. Although a graduate of a rabbinical seminary, all his life he strenuously opposed the backward and fanatic rabbis and their obscurantist supporters. For 20 years he was a teacher in various Jewish public schools in the Government of Kovno. In 1872 he was called to St. Petersburg to become secretary of the Society for the Dissemination of Culture among the Jews of Russia. Accused of political conspiracy in 1879, he was exiled to the Government of Olonetz. Having proved his innocence, he was soon allowed to return to St. Petersburg and became one of the editors of the Hebrew periodical *Ha-Meliz*. The Jewish massacre of 1882 and the subsequent persecutions embittered the last years of his life. His writings comprise poetry (6 vols., 1898), prose fiction (3 vols., 1870–89), and letters (2 vols., 1894). Besides Hebrew, Gordon wrote considerably in Russian. Yiddish, however, he deprecated, although he published a volume of poems in that language (*Sichoth Chulin*, 1886). Gordon is the greatest poet of the Haskalah, or rationalistic school of Hebrew writers, his epics and rhymed fables being especially excellent. His letters reflect most faithfully the intellectual conditions of Russian Jewry in the nineteenth century. Consult Slouschz, *The Renascence of Hebrew Literature* (Philadelphia, 1909).

GORDON, Julien. The pseudonym of Julie Grinnell Chance (q.v.), formerly Mrs. Van Rensselaer Cruger.

GORDON, Lady Lucie (or Lucy) Austin Duff- (1821–69). An English author and translator, born in London. She was the only daughter of John Austin the jurist. Her knowledge of German was gained during a two years' stay in Germany (1826–28). In 1840 she married Sir Alexander Duff-Gordon and almost immediately began her translations. These include: *Studies of Ancient Greek Mythology*, from the German of Niebuhr (1841); Meinhold's *Mary Schweidlet;* Lomping's *The French in Algiers* (1845); Feuerbach's *Remarkable Criminal Trials* (1846, with her husband); Ranke's *Memoirs of the House of Brandenburg;* De Wailly's *Stella and Vanessa* (1850); the Countess d'Arbouville's *The Village Doctor* (1853); and Ranke's *Ferdinand I and Maximilian II* (1853, with her husband). At this period she lived in London and counted among her friends Heine, Tennyson, Dickens, and Thackeray. About 1860 her health failed, and she made a voyage to the Cape of Good Hope, which her *Letters* describe (1861–62). The latter years of her life were spent in Egypt, and from there she wrote her two series of delightful letters, *Letters from Egypt* (1863) and *Last Letters from Egypt* (1865).

GORDON, Patrick (1635–99). A Scottish soldier of fortune, general in the Russian army, and a friend of Peter the Great. He first served (1651) in Poland under Charles X of Sweden. Captured by the Poles, he entered their service, only to rejoin the Swedes when recaptured by them at Warsaw. Next the German flag claimed his allegiance, but he soon took service again in the Swedish and Polish armies successively. In 1661 he entered the Russian service, in which he remained until his death. The Czar Alexis sent him on a mission to England, where, in 1665, he had an interview with Charles II. Although raised to the rank of lieutenant general in the Russian service and in high favor with the boy Czar, Peter, yet on another visit to England in 1686 he greatly desired to enter the army of James II. Peter would not grant him his request and soon afterward promoted him to the highest rank, that of general. In the contest between Peter and his sister Sophia, which resulted in a revolution, it was chiefly through Gordon's help that Peter triumphed. His last years were spent in opulence and honor and in high favor with the Czar. Gordon kept a journal during the last 40 years of his life, which was published at Moscow and St. Petersburg in three volumes in 1849–53, under the title *Tagebuch des Generals Patrick Gordon zum erstenmal vollständig veröffentlicht durch Dr. P. M. C. Posselt*, and a part of it was published in English in 1859, as *Passages from the Diary of General Patrick Gordon of Auchleuchries*.

GORDON, Patrick (1644–1736). An English soldier and Colonial Governor in America. After serving for some years in the English army, he was appointed Governor of Pennsylvania in 1726 and held this position until his death. A man of ability and character, he was one of the most popular of the Colonial governors of the province and was successful for the most part in winning the confidence of the Indians, though it was during his administration in 1733 that they were virtually defrauded of part of their lands by the famous "walking purchase." Gordon published *Two Indian Treaties at Conestogoe* (1728).

GORDON, William (1728–1807). An English clergyman and writer, born at Hitchin, Hertfordshire. He entered the independent ministry in 1752 at Ipswich, preached at Southwark from 1764 to 1770, emigrated to America in the latter year, settled at Roxbury, Mass., and remained in America until 1786, when he returned to England, where he subsequently held several pastorates. While in America, during the Revolutionary War, he strongly sided with the Patriot party and in 1788 published, in four volumes, a *History of the Rise and Independence of the United States, Including the Late War*, which for more than 100 years was considered one of the most valuable sources for the history of the Revolution, but which has recently been shown to have been plagiarized, in large part, from the *Annual Register*, and from Ramsey's *History of the Revolution in South Carolina*, which he saw in manuscript. Consult Libby, "A Critical Examination of Gordon's History of the Revolution," in the *Report of the American Historical Association* for 1899 (Washington, 1900). He also wrote a *Treatise Concerning Religious Affections* (1762) and was a contributor to the *Protestant Dissenter's Magazine*.

GORDON-CUMMING, Constance Frederica (1837–). A Scottish traveler and writer, the daughter of Sir William Gordon-Cumming, and a sister of R. G. Gordon-Cumming. She was born at Altyre. After 1867 she spent many years traveling in the East and published, among other books of travel, *From Hebrides to the Himalayas* (1876); *At Home in Fiji* (1882; 2d ed., 1886); *Fire Fountains of Hawaii* (1883); *Granite Crags of California* (1884); *In the Himalayas and on the Indian Plains* (1884); *Wanderings in China* (1886; 2d ed., 1900); *Two Happy Years in Ceylon* (1892). She also wrote *Work for the Blind in China* (1888), which is now incorporated in *The Inventor of the Numeral Type for China* (1899), an account of the life and work of the Rev. W. H. Murray, of Peking.

GORDON-CUMMING, Roualeyn George (1820–66). A British traveler and African lion hunter, brother of Constance Gordon-Cumming. From an early age he was fond of sports. He served under the East India Company in 1838–40, in the Royal Veteran Newfoundland Companies, and in the Cape Mounted Rifles in 1843. Resigning his last commission, he started on a five-year hunting trip in South Africa, chiefly in Bechuanaland and in the Limpopo valley. He returned to England in 1848 and two years later published the story of his hunting exploits in his book, *Five Years of a Hunter's Life in the Far Interior of South Africa.* This book was very successful; a third edition appeared in 1851, and an abridged edition under the title *The Lion Hunter of South Africa* came out in 1856 (new ed., 1904).

GORDON HIGHLANDERS. See Highlanders.

GORDONIA, gôr-dō′nĭ-ȧ (Neo-Lat., named in honor of James Gordon, a London nurseryman of the eighteenth century). A genus of trees and shrubs of the family Ternstrœmiaceæ, of which several species are natives of America. Of these the most important is the loblolly bay (*Gordonia lasianthus*), which is found in swamps near the seacoast from Virginia to the Gulf of Mexico. Moist tracts of considerable extent are often covered with this tree alone. It is a shrub, or small tree, with oblong leathery evergreen leaves and beautiful white sweet-scented flowers more than an inch in diameter. The bark is used for tanning. The wood is handsome, resembling mahogany, but is very perishable. In England it is cultivated with some difficulty and generally appears as a mere bush. *Gordonia altamaha,* an American species, is of interest on account of the entire disappearance of the tree in its original habitat; it is wholly unknown in a wild state. It is said to be hardy as far north as Massachusetts, and all the specimens now growing are believed to have sprung from a single tree that long stood in Bartram's garden in Philadelphia. A number of other species of this genus are found in eastern Asia. As ordinarily seen in cultivation, they are all shrubs. See Bay.

GORDON RIOTS. The name given to a mob uprising, directed against the Roman Catholics, which occurred in London in 1780. See Gordon, George, Lord; Barnaby Rudge.

GOR′DY, John Pancoast (1851–1908). An American educator, born in Maryland. He received an academic education and also studied at Leipzig. He was professor of education at Ohio University (Athens) from 1886 to 1896, at the Ohio State University (Columbus) from 1896 to 1900, and in 1901 was appointed to a similar chair in New York University. His most important publication is the *Political History of the United States, with Special References to the Growth of Political Parties,* vols. i and ii (2d rev. ed., 1903). He wrote also: *Lessons in Psychology* (1890); *Growth and Development of the Normal School Idea in the United States* (1891); *New Psychology* (12th ed., 1898); *A Broader Elementary Education* (1903).

GORE. In heraldry an abatement of honor. It consists of two curved lines which meet in an acute angle at the centre of the escutcheon.

GORE, Mrs. Catherine Grace (1799–1861). An English novelist, the daughter of a wine merchant named Moody, and born at East Retford, Nottinghamshire. In 1823 she married Capt. Charles Arthur Gore. Her first novel was *Theresa Marchmont, or the Maid of Honor* (1824). Some of her early novels, as the *Lettre de Cachet* (1827) and the *Tuileries,* were vivid descriptions of the French Revolution; but her greatest successes were her novels of English fashionable life, conspicuous among which were: *Cecil, or the Adventures of a Coxcomb* (1841), and its sequel, *Cecil, a Peer* (1841); *The Ambassador's Wife* (1842); and *The Banker's Wife* (1843). She also wrote a prize comedy entitled *Quid pro Quo, or the Days of Dupes;* a popular comedy called *The School for Coquettes* (1831); and several other dramatic pieces. Her novels and tales number about 100. Though very popular in their own time, they are now forgotten. They possess, however, great value as transcripts of contemporary fashionable society. Consult Thackeray's burlesque, "Lords and Liveries," in *Novels by Eminent Hands* (London, 1847).

GORE, Charles (1853–). An English theologian and prelate. He was educated at Harrow and at Balliol College, Oxford, and was a fellow of Trinity from 1875 to 1895. After ordination he held the position of vice principal of Cuddesdon Theological College from 1880 to 1883. On the foundation in 1884 of the Pusey House at Oxford, which was intended not only to provide a home for Dr. Pusey's large theological library, but to exercise spiritual influence over undergraduates by means of a staff of clerical librarians, he was appointed its head and remained there until 1893. Meanwhile, as editor and one of the principal contributors to the volume of essays called *Lux Mundi* (1890), he had aroused considerable distrust by the advanced and, as many thought, unsound nature of his views on the incarnate nature of Christ, especially the technical point known as the *kenosis* (q.v.); and his resignation was an obvious solution of the difficulty. While vicar of Radley, near Oxford (1893–94), he founded a quasi-religious clerical community called the Society of the Resurrection. He was canon of Westminster from 1894 to 1902 and continued to exercise considerable influence by his powers as a preacher. After 1898 he served as chaplain to the sovereign. In 1902 he was made Bishop of Worcester, in 1905 Bishop of Birmingham, and in 1911 Bishop of Oxford. His most important works are: *The Church and the Ministry* (1889); *The Mission of the Church* (1895); *Dissertations on Subjects Connected with the Incarnation* (1895); *The Body of Christ* (1901); *The Permanent Creed* (1905); *The New Theology and the Old Religion* (1908); *Orders and Unity* (1910); *The Question of Divorce* (1911), besides a strong controversial treatise called *Roman Claims* (1889), and commentaries on the epistles to the Ephesians (1899) and to the Romans (1899).

GORE, Christopher (1758–1829). An American lawyer and politician, born in Boston, the son of a Loyalist who was banished in 1778 and restored to citizenship in 1787. He graduated at Harvard College in 1776, studied law in the office of Judge Lowell, and soon established himself as a successful lawyer in Boston. In 1789 Washington appointed him the first United States district attorney for the State of Massachusetts. He held this office until 1796, in which year he was appointed, with William Pinckney and Jonathan Trumbull, a commissioner to England, under the Jay Treaty, to settle the American spoliation claims, and he remained in England eight years. In 1803–04 he was chargé d'affaires at London during the absence of Rufus King, the American Minister. He returned to America in 1804 and resumed the practice of his profession in Boston. He allied himself with the Federalist party, by the leading members of which his advice was much sought. He was, in 1808, a vigorous opponent of the Embargo, and was accused by the Republicans, with Pickering and other members of the Essex Junto, of planning the secession of New England and New York from the Union and erecting an independent confederacy under the protection of England. In 1809 he was elected by the Federalists Governor of Massachusetts. He was, however, defeated in 1810 by Elbridge Gerry. He was the unsuccessful candidate of his party again in the following year, being defeated a second time by Gerry. After several years spent in private life during a period of great political excitement, he was, in 1814, appointed to the United States Senate by Governor Strong to fill a vacancy, which appointment was confirmed by the Legislature in the following year. In 1817 he resigned from the Senate on account of ill health and passed the remainder of his life on his large country estate at Waltham, Mass. Consult a "Memoir," in *Massachusetts Historical Society Collections*, 3d series, vol. iii (Boston, 1833).

GORE, George (1826–1908). An English physicist and chemist, born at Bristol. He did not attend school after his twelfth year, but while earning his living he applied himself so industriously to study that he was able to make discoveries which secured for him an election as fellow of the Royal Society (1865), and the degree of LL.D. from the University of Edinburgh (1877). His researches in the main were in the departments of electrochemistry, electrometallurgy, and chemistry, and were rewarded by many discoveries which are described in the leading English scientific journals. Gore was for many years lecturer on physics and chemistry at the Grammar School of King Edward VI at Birmingham. In 1891 he was awarded a civil-list pension of £150 a year in recognition of the national importance of his scientific discoveries, several of which have had widespread application in the arts. He was the author of *The Art of Scientific Discovery* (1878); *The Scientific Basis of Morality* (1882); *The Art of Electro-Metallurgy* (1877; 5th ed., 1891); *The Electrolytic Separation and Refining of Metals* (1890); and other works.

GORE, Thomas Pryor (1870–). An American legislator, born in Webster Co., Miss. When he was eight years old, an accident cost him the sight of his left eye, and, when eleven, he lost the sight of his right eye also. Nevertheless, he was able to graduate from the normal school at Walthall, Miss., in 1890 and from Cumberland University in 1892. He taught school in 1890–91 and was admitted to the bar and began the practice of law in Mississippi in 1892. Moving to Texas in 1895, he was candidate for Congress on the People's party ticket in 1898, but having become a Democrat the next year he did campaign work for his party in South Dakota in 1900 and in various States in 1904, becoming noted as an orator. In 1901 he moved to Oklahoma, where he was a member of the Territorial Council in 1902–05. Upon the admission of Oklahoma to statehood, he was elected United States Senator in 1907, being reëlected for a full term in 1909. In 1912 he became a member of the executive committee of the Democratic National Committee. In 1914, through what was afterward supposed to have been a political "frame-up," suit was brought by a woman against Senator Gore, accusing him of dishonorable conduct; he was completely exonerated, and was again reëlected.

GORE′BILL. A garfish. See Gar.

GORECKI, gō-rĕts′kē, Anton (1787–1861). A Polish poet, born and educated in Vilna. He took an active part in the Polish revolution of 1830 and in consequence was obliged to flee to Paris. His complete works were published in two volumes at Leipzig in 1886. One of his best-known productions is entitled *The Death of the Traitor.*

GORÉE, gō′rā′. A small island southeast of Cape Verde, off the west coast of Africa. It is about 3 miles in circumference, and the larger part is occupied by the town of Gorée, once an important free port, but now of little commercial importance. Its present value lies in its climate, and it serves as a health resort for the French officials stationed on the west coast of Africa. It is fortified and has a population of about 2000. The island was first in the possession of the Dutch, but has belonged to the French colony of Senegal since 1814.

GORE HOUSE. A mansion in Kensington, London, famous as a gathering place for literary men, through its two tenants, William Wilberforce and the Countess of Blessington. The former took up his residence there in 1809. Upon the site now stands the Albert Memorial.

GOR′ELL OF BRAMP′TON, John Gorell Barnes, Baron (1848–1913). An English jurist and judge, son of Henry Barnes, a Liverpool shipowner. He was educated at Peterhouse, Cambridge; became a solicitor, in 1876 a barrister of the Inner Temple, and in 1888 a Queen's counsel; practiced largely in admiralty cases; and in 1892–1905 was judge, and in 1905 president (succeeding Sir Francis Jeune), of the probate, divorce, and admiralty division of the High Court of Justice. He was made first Baron Gorell of Brampton in 1909. From 1910 to 1912 he was chairman of the Divorce Commission, of which his son, Henry Gorell Barnes (1882–), who succeeded to the title, was secretary.

GOREMÝKIN, gŏr′ĕ-mĭk′ĭn, Ivan Logginovitch (1839–). A Russian statesman, born in the Government of Novgorod. In 1860 he entered the Imperial Law School of St. Petersburg (Petrograd) and four years later went, with the commission to form a new government, to Poland. There he stayed for several years, becoming Vice Governor of Plock in 1866 and of Kielce in 1869, and returning to Poland for the years 1873–79. In 1881 and 1893 he served on commissions on agrarian reform, and his reports on the condition of the peasants won him the Czar's confidence, so that (after serving in the Department of Justice in 1891 and in the Ministry of the Interior) he was Minister of the Interior in 1895–99, succeeding Durnovo. His administration was comparatively mild: Jews with university education were permitted to live outside the pale; the first census of the Empire was taken in February, 1897. Probably he helped plan the first Peace Conference. In 1897 he addressed a memorial to the Czar urging administrative reform. Witte's opposition to his plan (1899) to extend *zemstvo* representation forced Goremýkin out of the cabinet. Succeeding Witte as Premier in May, 1906, although he had the Czar's confidence, he had to resign in July after a contest with the impractical and far from docile first Duma. In February, 1914, he became Premier again, succeeding Kokovtsoff. He wrote in 1869 a historical sketch of the Polish peasantry. For a brief sketch of his career, consult Cleinow in *Grenzboten*, Jahrg. 73, pp. 337–348 (1914).

GORGAS, gôr′*gas*, William Crawford (1854–). A distinguished American sanitarian, surgeon general in the United States army. He was born at Mobile, Ala., and graduated from the University of the South in 1875 and from Bellevue Hospital Medical College in 1879. After serving as an interne at Bellevue in 1878–80, he was appointed a surgeon in the army in 1880. From 1898 to 1902 he was chief sanitary officer of Havana, Cuba, where his methods of fighting yellow fever succeeded in eliminating that disease from the city. For these services Congress, by a special Act in 1903, made him assistant surgeon-general, with the rank of colonel. From 1904 to 1913, as chief sanitary officer of the Panama Canal, he established and maintained marvelously healthful conditions on the Isthmus throughout the great community of workers, most of whom had to become acclimated and to adjust themselves to the food and habits of a tropical land. The task of Colonel Gorgas was in its way as great as that of the engineers; without his resourcefulness, skill, and untiring labor the building of the canal would have meant immense sacrifice of life. He was a member of the Isthmian Canal Commission after 1907 and received numerous honors —he was elected president of the American Medical Association in 1908 and of the American Society of Tropical Medicine in 1910, was awarded the Mary Kingsley medal of the Liverpool School of Tropical Medicine in 1907, was delegate from the United States to the Pan-American Medical Congress at Santiago, Chile, in 1908, and was the recipient of honorary degrees from a number of American universities, among them Harvard, Brown, Columbia, Princeton, and Yale, and the degree of D.Sc. from Oxford (1914). He received a gold medal from the American Medical Association in 1914; and in the same year he was appointed surgeon-general in the United States army with the rank of brigadier general. See Panama Canal.

GORGE. The rear opening between the faces or flanks of a fieldwork or fortification. The *gorge* is prepared for defense by obstacles or trenches, or both. See Bastion.

GORGED (from OF., Fr. *gorge*, throat, from Lat. *gurges*, gulf). A term in heraldry (q.v.), applied to a lion or other animal having a collar round its neck. The collar is generally in the form of a crown or coronet.

GORGES, gôr′jĕs, Sir Ferdinando (c.1566–1647). The founder of Maine and sometimes called "the father of English colonization in America." He was born probably in Ashton Phillips, England, entered the army, served in Normandy in 1591, distinguished himself and was knighted at the siege of Rouen, and from 1596 to 1629 he was, with but a short suspension in 1603, "Governor of the forts and island of Plymouth." He seems to have been engaged in the conspiracy led by the Earl of Essex, against whom he was witness in the trial of 1601. Becoming early interested in the settlement of the New World, he was one of the grantees in the royal charter of 1606 and was one of the founders of the unsuccessful Popham Colony at the mouth of the Kennebec River, in Maine, in 1607. Capt. John Smith, as agent for Gorges, made several unsuccessful attempts to establish other settlements; and in 1616 Gorges sent out a small party which encamped for the winter on the river Saco. In 1620 Gorges and his associates obtained a new charter, which gave them title to the territory between the fortieth and forty-eighth parallels north latitude, extending westward from the Atlantic to the Pacific. Gorges and John Mason, in August, 1622, took from the Council for New England a grant of the district lying between the Merrimac and the Kennebec and extending 60 miles inland; and under the auspices of the former several settlements were made. In 1629 this grant was divided, Gorges taking the portion east of the Piscataqua. In 1623 Capt. Robert Gorges, son of Ferdinando, was appointed by vote of the Council for New England "General Governor of the country." Twelve years later the Council resigned the charter to the King, the elder Gorges expecting to be thereupon appointed Governor-General. Disappointed in this, he induced the King to grant him a charter constituting him lord proprietor of the Province of Maine and providing that his office should remain hereditary in his family. His son, Thomas, was sent out as Deputy Governor. The principal settlements were Agamenticus and Saco, the former being the place now called York, which was chartered as a city in 1642 under the name of Gorgeana. But the English Civil War, in which Gorges was a follower of the King, was unfavorable to his Colonial project. In 1643 the four New England Colonies formed an alliance for mutual defense, excluding therefrom the Gorges settlements, and after his death these settlements formed themselves into a body politic and submitted to the jurisdiction of Massachusetts. Gorges wrote *A Briefe Narration of the Originall Undertakings of the Advancement of Plantations into the Parts of America, especially showing the Beginning, Progress and Continuance of That of New England* (1658), which has been much used by historians and may be found in vol. ii of the *Maine Historical Society Collections* (Portland) and in the 3d series, vol. vi of the *Massachusetts Historical Society Collections.* Consult Baxter (ed.), *Sir Ferdinando Gorges and his Province of Maine* (3 vols., Boston, 1890), one of the "Prince Society Publications."

GORGET, gôr′jĕt (OF. *gorgette, gorgete*, Fr. *gorgette*, collar, dim. of *gorge*, throat). One of a series of surgical instruments, devised to facilitate the operation of lithotomy. Gorgets are now almost entirely out of use.

GÖRGEY, gĕr′gĕ-ĭ, or **GORGEI,** Arthur (1818–1916). An Hungarian general in the revolution of 1848–49. He was born at Toporcz, in the County of Szepes (Zips), Jan. 30, 1818, received a military education, and was commissioned a lieutenant of hussars. While at Vienna, he combined a university education with his military work. He threw in his lot with the National party in the rising against Austria in 1848 and was at first employed in the purchase of arms in Belgium. In August, 1848, he received an important command and soon distinguished himself against the Croats, whom he prevented from crossing the Danube. He exhibited great military capacity after the rout of the Hungarian army near Schwechat, in October, 1848, conducting the retreat with consummate skill. Upon the appointment of Dembinski (q.v.) to the chief command of the Hungarian armies, Görgey showed his dissatisfaction in various ways, and it was said that his late arrival at the battle of Kápolna prevented a great Hungarian victory. He practically revolted against Kossuth and the government.

After Dembinski's resignation Görgey was made commander in chief in his place and succeeded in putting into the field an army of 40,000 men, with which he executed a brilliant advance against the Austrians under Windischgrätz. Pest was evacuated by the enemy, the siege of Komorn was raised, and before the month of April was over the Austrians had been almost driven out of Hungary. Buda, the ancient capital of the realm, well fortified and garrisoned, had still to be taken, and for this the victorious campaign was interrupted. The city was stormed May 21, but the three weeks' delay proved fatal. Russia intervened in behalf of Austria, and Radetzky sent several regiments from his victorious army in Italy. After an unsuccessful engagement at Komorn and a battle with the Russian main army at Waitzen (July 15), he made his way towards the upper Theiss. The Hungarians, outnumbered by the united Austrian and Russian armies, were gradually driven to the wall. Görgey, after some weeks, arrived in the neighborhood of Arad with an army decimated by continual fighting, by heavy marches, and by disease. On August 9 the army under Dembinski was vanquished in the battle of Temesvár, and on the 10th Görgey was declared dictator in place of Kossuth. But further resistance on the part of the Hungarians was hopeless, and on the 13th Görgey's army surrendered at Világos to General Rüdiger, the Russian commander. For this surrender Görgey was severely blamed and charged with treachery; but the facts are that on the day of surrender Görgey had only 24,000 men with 140 cannon, while five armies, with more than 200,000 men and 1000 cannon, were closing in upon him from every direction. Görgey was confined for a time at Klagenfurt in Austria, whence he was released on parole. All of his generals were court-martialed, but he escaped that ignominy. In 1852 he published at Leipzig *Mein Leben und Wirken in Ungarn in den Jahren 1848 und 1849*, a translation of which, *My Life and Acts in Hungary, 1848–49*, appeared in New York the same year. This was really a reply to the charge of treason to the Hungarian cause. He returned to Hungary in 1868. Consult Elemar, *Gorgei in 1848–49* (Budapest, 1886).

GOR′GIAS (Lat., from Gk. Γοργίας) (c.483–375 B.C.). A celebrated Greek rhetorician and Sophist. He was born at Leontini in Sicily, but spent most of his life in Greece, residing at Athens and at Larissa in Thessaly. The arrival of Gorgias at Athens as an Ambassador from his native state, in 427 B.C., was fraught with important consequences for the literary life of Athens, for in him the Athenians first saw an exponent of the art of rhetoric as it had been developed in Sicily. The success of Gorgias was immediate. The Athenians thronged to hear his speeches, and it is not too much to say that the great development of oratory at Athens during the fourth century was due primarily to this Sicilian orator. Numerous teachers of rhetoric, the Sophists (q.v.), sprang up, against whose doctrine of "form, rather than substance," Socrates and Plato directed their teaching. In the *Gorgias* of Plato we have an ideal dialogue between the Sicilian orator and Socrates. Two orations—the *Palamedes* (Παλαμήδης) and the *Encomium on Helen* (Ἑλένης Ἐγκώμιον)—have come down under his name, but scholars are not agreed whether they are really by him or not. Consult: Blass, *Die attische Beredsamkeit*, vol. i (Leipzig, 1887); Jebb, *The Attic Orators*, vol. i (London, 1876); Gomperz, *Greek Thinkers*, vol. i (Eng. trans., ib., 1905); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908).

GOR′GO, or **GOR′GON** (Gk. Γοργώ, *Gorgō*, Γοργόνη, *Gorgonē*, Γοργάς, *Gorgas*, from γοργός, *gorgos*, grim). A sister of the Grææ (q.v.) and the daughter of Phorcys and Ceto. In the *Odyssey*, xi, 633, Odysseus fears that Persephone may send forth against him the Gorgon's head, which is therefore regarded as belonging to the Lower World. The later legend, given by Hesiod, knows Gorgo as a terrible female monster, with hideous face, hair of bronze or intertwined with serpents, mighty wings, and clad in black. Gorgo or Medusa (Μέδουσα, the Queen) is mortal, but her two sisters, Σθενώ (the Strong) and Εὐρυάλη (the Far Leaper), are immortal. Medusa is the most terrible; one glance from her eyes turns any human being to stone. Though she was hated by the other gods, Poseidon loved her. These Gorgons lived in the Far West, near the garden of the gods and the realm of the dead. Medusa was beheaded by Perseus and from her trunk sprang the fruit of Poseidon's love, Chrysaor, of the golden sword, and the winged horse, Pegasus. The head, with its petrifying power, was used by Perseus against his enemies and was later taken by Athena and placed upon her ægis. Attic legend knew of but one Gorgon, produced by Gæa to aid the giants against the gods, and slain by Athena, while the later poets explained Poseidon's love by telling of the maiden Medusa, who won the love of the god, but inspired the jealousy of Athena, who transformed her into the hideous monster and guided Perseus to her destruction. Roscher (see below) held that the Gorgons are a personification of destructive and terrifying thunderstorms, which come with speed from the western ocean. Hence the golden sword of the lightning and the bearer of thunderbolts, Pegasus, spring from her dead body. Hence, too, the appearance of the Gorgoneion on the ægis of Zeus and Athena, who are armed with the thunderbolt. The head of the Gorgo was used by the Greeks for apotropaic purposes, i.e., to ward off the evil eye or other evil influences. Another view, noting that the power of Medusa was in her head, explains the whole story of the Gorgon as derived from the ritual mask common to primitive cults. In Greek art the Gorgoneion does not appear much before the seventh century B.C. Its earliest form is certainly the hideous mask, with round face, snaky hair, huge staring eyes, and wide mouth, with projecting tongue and tusklike teeth, which was used to keep off the evil spirits, and from which the later figure of the Gorgon develops. There was a later conception of the Gorgon as beautiful, best seen in the "Medusa Rondanini" at Munich. Consult: Roscher, *Die Gorgonen und Verwandtes* (Leipzig, 1890); Six, *De Gorgone* (Amsterdam, 1880), especially for the coin types. Particularly good are the article by Roscher and Furtwängler in Roscher's *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886–90) and that by Glotz, in Daremberg and Saglio, *Dictionnaire des antiquités* (Paris, 1896). Consult also Harrison, *Prolegomena to the Study of Greek Religion* (Cambridge, 1903).

GORGO′NIA′CEA (Neo-Lat., from *Gorgonia*, from Lat. *gorgonius*, relating to the Gorgon, from *Gorgo*, Gorgon; so called from hardening in the air). An order of alcyonarian corals (Octocoralla), in which the colony has a branching or fan-shaped structure. See SEA FAN, and Plate with CORAL.

GOR′GONZO′LA. A town in the Province of Milan, north Italy, 11 miles northeast of the city of Milan, famous for its cheese. Pop. (commune), 1901, 4895; 1911, 5198.

GOR′HAM. A town in Cumberland Co., Me., 10 miles northwest of Portland, on the Presumpscot River, and on the Boston and Maine Railroad (Map: Maine, B 5). It is in an agricultural region, has a tannery, and contains a State normal school, public library, and an historical museum. Pop., 1900, 2540; 1910, 2822.

GOR′HAM, GEORGE CORNELIUS (1787–1857). An English theologian, who became known as the principal figure in the "Gorham case." He was born at St. Neots, Huntingdonshire, was educated at Queen's College, Cambridge, received the degree of B.A. in 1808, was elected a fellow of his college in 1810, and held that appointment until 1827. Even before his ordination (1811) there, his views on baptismal regeneration had caused comment, and particularly his contention that by baptism infants do not become members of Christ and the children of God; but the discussion did not become crucial until the question of his appointment to the vicarage of Brampford Speke came up before Dr. Phillpotts, Bishop of Exeter. (See GORHAM CONTROVERSY.) Gorham obtained his vicarage in 1851, and the question of the views on baptismal regeneration allowed in the Church of England was left unsettled. He was an antiquary of some reputation and the author of a number of pamphlets.

GORHAM CONTROVERSY. A theological controversy within the Church of England as to the teaching of this church with reference to the sacramental grace of baptism. The occasion was a suit by the Rev. George C. Gorham against the Bishop of Exeter for induction into the vicarage of Brampford Speke, in spite of his denial of baptismal regeneration. The Arches Court of Canterbury decided in 1845 against Mr. Gorham, maintaining that baptismal regeneration is the doctrine of the Church of England, while on appeal the judicial committee of the Privy Council reversed the judgment of the lower court, without, however, expressing any opinion as to the theological accuracy of Mr. Gorham's opinions. The decision and the attitude of the high dignitaries of the Church of England, amid the fierce controversy which arose in regard to it, were the main determining factors in Manning's decision to submit to the Roman obedience. Consult Purcell, *Life of Cardinal Manning* (London, 1897).

GORI, ga̤′rē. The capital of a district in the Russian Government of Tiflis, Caucasus, 48 miles west-northwest of Tiflis, on the Poti-Tiflis Railway (Map: Russia, F 6). It is picturesquely situated at an elevation of 2000 feet and at the foot of a mountain crowned with the ruins of the ancient fortress of Goris-Tsikhe. In one of its churches is kept an ancient icon, believed to have been presented in the sixth century to a member of the family of the Bagratides by one of the Byzantine emperors. Gardening, vine growing, wine making, and trading are the principal occupations. Pop., 1891, 7200; 1897, 10,450. Founded, probably, in the seventh century.

GORI, gō′rē, ANTONIO FRANCESCO (1691–1757). An Italian antiquary. He was born at Florence, where he was ordained a priest in 1717. Through the influence of Archbishop Fontanini he was enabled to devote himself extensively to antiquarian and archæological studies. He succeeded Corsotti in the chair of history at the University of Florence, founded the *Academia Columbaria* in 1735, and continued the catalogue, begun by Assemani, of the Oriental books and manuscripts at Florence. Among his writings, which had a very considerable influence on the progress of archæological science, are: *Inscriptiones Antiquæ Græcæ et Romanæ quæ Extant in Hetruriæ Urbibus* (1726–44); *Monumentum Columbarium Libertorum et Servorum Liviæ Augustæ et Cæsarum* (1729); *Museum Florentinum* (1731–43); *Museum Etruscum* (3 vols., 1737–43); *Symbolæ Litterariæ* (1748–58); *Vita di Mich. Angelo Buonarotti* (1746); *Thesaurus Diptychorum, cum Notis Passerii* (3 vols., 1759), probably his most valuable work.

GORIL′LA. The greatest of the anthropoid apes (*Gorilla gorilla*), a native of the western equatorial coast of Africa. Its name recalls a curious history. When Hanno, the Carthaginian, returned from his voyage of exploration down the west coast of Africa, about 500 B.C., he reported that he had seen hairy women whom the natives called gorillas (Gk. γορίλλαι); but as he went only to the Bight of Benin, and gorillas, so far as we know, never lived north of the Kameruns, the creatures Hanno saw, if any, were either chimpanzees, or, more probably, dog-faced baboons. The next mention of the animal is in an account printed in 1613 in *Purchas, His Pilgrims,* of the experiences of an English sailor named Battel on the Guinea coast, in which he tells of a great ape which the natives knew by various names, and the Europeans called gorilla. Such an ape was described again by Bowdich in his *Mission from Cape Coast Castle to Ashantee* (London, 1819). Finally, in 1847, Prof. Richard Owen, of London, obtained from Dr. Savage, a missionary at the Gabun, drawings of the skull of the mysterious ape, and a few months later Professor Owen received two skulls, which he described as "Troglodytes savagei," considering the animal to be of the same genus as the chimpanzee. That an American missionary, Rev. Leighton Wilson, is entitled to credit for early investigation of the animal, appears from his book, *Western Africa* (New York, 1856), in which he gives an extended account of the "recently discovered" gorilla, and says that he was "the first to call the attention of naturalists to the animal." He found a skull towards the close of 1846 and sent it to the Boston Society of Natural History, where it became the subject of immediate study and writings. Indeed, Wyman's description of this ape as *Troglodytes gorilla* in the Journal of the Society antedated that of Owen, so his specific name takes precedence. Wilson's book contains much interesting information.

In 1852 a migration of these apes was made to the coast (probably due to an extraordinary failure of food in the interior, for one has never been seen there since), and several were killed whose skeletons reached both Europe and America. This new material showed such departures from the structure of the chimpanzee that a French naturalist, I. Geoffroy Saint-Hilaire (consult *Comptes Rendus*, vol. xxxiv, Paris, 1852), erected for it a new genus, *Gorilla*, based upon such peculiarities as the great cranial ridges, the shape of the teeth, the disparity in size between the sexes, etc.; and this has received scientific approval. Owen's classic anatomical studies were in the *Transactions* of the Zoölogical Society of London for 1848, and in the *Proceedings* of the Royal Institution, for 1855, part ii.

The gorilla is not only the largest anthropoid ape, but the males are on the average larger than man himself, usually exceeding 6 feet in height when they stand upright. The females, however, unlike any other kind of ape, are always much smaller, usually 4½ feet tall, nor do they have great protuberances above the orbits of the eyes, and the long, exposed canine teeth, which give their mates so ferocious an appearance. The shoulders of a male gorilla are extraordinarily broad and massive, supporting a somewhat conical head on a thick "bull" neck, and giving attachments and leverage necessary for the powerful muscles of arms that, when they hang by his side, reach nearly to the calf of the leg. The hands are very broad, and the fingers short, thick, and united by webs nearly to the first joint. The legs are shorter in proportion than man's, have fairly developed calves, and the feet, like the hands, are broad and blunt, the toes being very large and short, and the great toe set out at an angle like a thumb; and the whole foot is nearly straight. The body is covered in most parts with long, coarse hair, blackish below but whitish at the tips, giving a brownish-gray aspect; but individuals vary greatly in color, and all grow grizzled with age. This hair becomes very long on the shoulders, back, and thighs, and on the top of the head and nape is stiff and erectile, rising like a dog's hackles when the gorilla is angry. There is a distinct beard or ruff under the chin. Beneath the outer coarse hairs grows a coat of short curly hairs, approximating to a wool. "The whole skin of the face is of a deep-black color, of a glossy appearance, and sparsely sprinkled with coarse hairs. The ears are comparatively small, with their hinder border sharply angulated in the middle, . . . and of a deep-black hue."

The gorilla is a denizen of mountainous forests, and its habitat is confined to a narrow coast region of the French Congo, extending 3° or 4° north and south of the equator, drained by the Ogove, Gabun, and upper Benito rivers—probably less than 1000 square miles of territory. This is a hilly region of comparatively open, yet damp and shady forest, with thickets of scitamines and tree ferns, which abounds in trees bearing fruits that ripen at various times, affording the animals food the year round; in addition to which the gorillas occasionally raid the plantations of sugar cane, rice, etc., cultivated about the native villages.

It appears that these animals remain in the forest and are most common in the Sierra de Cristal, between the Ogove and Muni rivers. They spend most of their time in the trees, where they move about with surprising agility, considering their bulk, and swing and leap like the huge monkeys they are. They wander during the day in search of food in family parties consisting of two mates and offspring of various ages, but at night are wholly stationary. Several writers assert they make nests only for the lying-in of pregnant females; but Herr Koppenfels declares that each night the female plaits the branches of a tree top into a platform, and adds to this sticks and leaves, or moss, until she has a comfortable sleeping place for herself and her young ones; and that this is sometimes returned to for three or four nights in succession, but not longer. The male is said to sleep curled up at the foot of the tree, prepared to guard his family against leopards—almost the only foe he need fear. The gorilla's food consists mainly of fruits, especially the undeveloped spathe or "cabbage" of the oil palm, bananas, pawpaws, several plumlike fruits, and nuts, the hardest of which, allied to the kola nut, he cracks with a stone; but his great back teeth are well adapted to nut cracking and to crushing tough rinds. The gorilla also eats insects, honey, birds' eggs, and fledglings, and he is said to take flesh when he can get it, though he is not known to seek to kill other animals for the sake of eating them.

These animals are mainly arboreal, and when they go upon the ground usually walk on all fours, as their tracks constantly show, always turning the fingers of the hands under, and sometimes also the toes of the hind limbs. They walk erect with some difficulty, unless they can steady themselves by grasping something. They are shy, and even timid, usually retreating from man, and are rarely seen, even by the silent and stealthy natives of the forest, except by accident. When surprised, they run away screaming with fright, but if wounded or cornered make a terrible fight, using much the tactics of a bear, by rearing up and endeavoring to seize and pull the enemy near enough to tear it with their great teeth. Little is known of the exact range of these apes. Elliot recognizes two species which are divided into six forms.

Young gorillas are occasionally captured by the negroes, and several have reached Europe and America—the first as early as 1860, when it was carried about Great Britain for several months, no one regarding it as anything but a chimpanzee until after its death. Up to the year 1914 four or five have been seen in Berlin, London, and New York; but, in spite of the greatest care, only one survived more than 18 months before succumbing to lung disease. At that time a young specimen, two years old, in perfect health, was living in the New York Zoölogical Park. All of the gorillas which have been in captivity have been of a gentle, docile disposition, showing traits and an ability to learn very similar to those of the chimpanzee, eating all sorts of food, and having a childish fondness for their friends and for noise making and amusements.

Bibliography. The books already mentioned, and such general works as *Standard Natural History* (6 vols., Boston, 1885) and the *Royal Natural History* (6 vols., London, 1895), contain much of what is known of the subject. Consult also Hartmann, *Anthropoid Apes* (New York, 1886), which also furnishes a complete comparative account of the animal's structure and an extensive bibliography, and Elliot, *A Review of the Primates* (ib., 1913). See Plate of ANTHROPOID APES, under APE.

GORINCHEM, gō′rĕn-кĕm. See GORKUM.

GOR′ING, GEORGE, EARL OF NORWICH (c.1583–1663). See NORWICH, GEORGE GORING, EARL OF.

GORING, GEORGE, LORD (1608–57). An English soldier, son of George, Earl of Norwich.

(See Norwich.) He married Lettice, daughter of the Earl of Cork, by whose influence he received a post in the Dutch service. He was wounded at Breda (1637), was appointed Governor of Portsmouth (1639), and served in both Scottish wars. He took part in the first army plot, hoping to become lieutenant general, but played the conspirators false as soon as he saw that his advancement was not certain. But he was never really allied with Parliament and in 1641 had made his peace with the King. He tried to get money both from the King and from Parliament, but in the fall of 1642 declared openly for the King. A month later Portsmouth was captured, and Goring fled to Holland and there tried to advance the King's interest. In 1643 he was again in England and after defeating Fairfax at Seacroft Moor was captured by him at Wakefield and sent to the Tower, but was finally exchanged. In 1644 he commanded the left wing at Marston Moor and was in the second battle of Newbury. His intrigues against Rupert, to win himself a command and to make himself indispensable, were grave factors in the defeat of the Royalist cause. He went so far as to quarrel openly with Prince Charles's counsel when the Prince came to take command in the West. He was forced to leave the siege of Taunton to meet Fairfax, after Naseby, and was defeated by him again at Langport (1645). Goring retreated to the north and left the Parliamentary army without opposition. Soon after he went to France on a plea of ill health. He served in the English regiments in the Netherlands.

GÖRITZ, gẽ'rĭts. See Görz.

GOR'KUM, GOR'CUM, or **GORINCHEM**, gō'rẹ̈n-kĕm (Lat. *Gorcomium*). A town in the Netherlands, situated on the Merwede, 28 miles east-southeast of Rotterdam. The town has fortified gateways of the seventeenth century and interesting specimens of Dutch brick and tile mosaic architecture. It is famous for its salmon fisheries and carries on a trade in grain, hemp, and cattle. The town is the terminus of the Merwede Canal to Amsterdam. Gorkum is historically important as being the first city taken from the Spaniards by the Water Gueux in 1572. Pop., 1911, 12,053.

GORKY, gôr'kė, Maxim. The pseudonym of Alexèi Maximòvitch Péshkov (1868–). A modern Russian writer, born at Nizhni Novgorod. Left a double orphan in early childhood, he was apprenticed to a shoemaker at nine. He then worked at the manufacture of ikons, as cook's helper, baker, public porter, and fruit vender, finally becoming a lawyer's clerk. It was from the cook on board a Volga steamer that Gorky acquired his literary passion and a thirst for knowledge. He was only 12 at the time, but four years later he set out for the University of Kazan in a vain effort to secure a free education. Disappointed and disgusted, he resumed his desultory pursuits. At 19 he attempted suicide and a few years later, in the company of outcasts and vagabonds, went tramping through south Russia. He was twice arrested for his revolutionary sympathies. In 1906, at the height of his popularity, he traveled in Europe and visited the United States in search of funds for the cause of Russian freedom. In America the intrusion of a moral issue of a personal nature—the legal status of a woman whom Gorky considered as his wife—ruined his mission and caused a revulsion of feeling against him which culminated in social ostracism. He then sailed for Italy, where he lived thereafter.

Gorky's first sketch, *Makar Chudra*, appeared in 1892, but attracted little attention. His second striking tale, *Chelkash*, appearing in 1895 in *Russkoye Bogatsvo*, started the writer on the road to fame. In five years he became so popular in Russia that the first collection of his stories (1900) quickly sold out a large edition, and subsequent editions were equally successful. Beyond Russia Gorky's fame spread with amazing rapidity after 1901, when his first two tales appeared in English. Since then his works have been translated into every European language. Space forbids mentioning his short stories available in English. The following collections contain some of the better known: *Orloff and his Wife* (containing seven other tales, 1901); *Twenty-Six and One* (with two other tales, 1901); *The Outcasts and Other Stories* (1902); *Tales from Gorky* (nine in all, 1902); *Heartache, and The Old Woman Izerofel* (1905); and *The Individualists* (containing two other tales, 1906). His longer works in English include *Foma Gordeyev* (1901), *Three Men* (1902), *Mother* (1907), *The Spy* (1908), *A Confession* (1910), and the following dramas, which appeared in *Poet Lore: Summer Folk* (1905), *A Night's Lodging* (1905), *The Children of the Sun* (1906), *The Smug Citizen* (1906), and *The Lower Depths* (1912).

Gorky's most congenial field is the tale of the underworld he knows so well. When he leaves this realm, or when he attempts anything beyond the short story, he is far less successful. His plays, too, though full of color and interesting situations, lack dramatic inspiration. In his idealization of the underworld he has undoubtedly sounded a strong new note in Russian literature, yet he will hardly rank high in its annals, unless his best work is still to come. Admirable brief studies of Gorky will be found in Kropotkin, *Russian Literature* (London, 1905); Phelps, *Essays on Russian Novelists* (New York, 1911); and Persky, *Contemporary Russian Novelists* (Boston, 1913). Consult also Ossip Lourié, *La psychologie des romanciers russes* (Paris, 1905).

GÖRLITZ, gẽr'lĭts. A town in the Prussian Province of Silesia, capital of the circle of Görlitz, situated on the Neisse, 62 miles by rail east of Dresden (Map: Germany, F 3). It has still retained in part its old buildings and fortifications, though the old walls have been demolished and their places taken by modern walks and driveways. There are extensive modern quarters. Chief among the ecclesiastical buildings of Görlitz is the large Protestant church of St. Peter and St. Paul, originally built in the thirteenth century, rebuilt in the fifteenth century, and partly renovated after a fire at the end of the seventeenth. The church is a good specimen of late Gothic style and has a fine crypt and two modern towers. The chapel of the Holy Cross contains a model of the Holy Sepulchre at Jerusalem, made during the fifteenth century. Other noteworthy churches are the late Gothic Frauenkirche, dating from the fifteenth century; the Trinity, or Abbey, Church, dating from 1245 and restored in 1868; and the new Protestant Church, consecrated in 1901. The sightly Rathaus, built in the Gothic and early Renaissance styles, has a remarkable staircase and fine examples of wood carving. A massive bastion of the fifteenth century, well worthy of attention, is now used as a guardhouse. Many fine examples of Renaissance architecture are also found among the private dwellings, and there are numerous monuments and fountains. The attractive municipal park contains a botanical garden and several statues, including one of Jakob Böhme, the mystic, who was born near Görlitz in 1575 and passed most of his life in this place. The municipality owns about 70,000 acres of forests and is accounted one of the wealthiest towns of Germany.

Among the educational institutions the most prominent are the two Realgymnasien and one classical Gymnasium, the seminary for female teachers, the municipal museum of antiquities, the municipal theatre, the municipal library, containing many valuable manuscripts and incunabula, and the library of the Upper Lusatian Scientific Society. The city is well provided with benevolent institutions as well as with art and scientific organizations. It is one of the most important industrial points of Silesia. The leading manufactures are cloth goods. There are also produced railway supplies, leather and leather manufactures, glass, tobacco, cars, chemicals, machinery, gold and silver wares, toys, cigars, and sausages. The retail trade is carried on to a large extent by coöperative stores. Pop., 1890, 62,135; 1900, 80,931; 1910, 85,806, mostly Protestants.

Görlitz, which bears the name of a Slavic village near which it rose, was founded about 1200. It received Magdeburg rights in 1303 and joined the league of the six towns of Upper Lusatia in 1346. From 1377 to 1396 it was the capital of the Duchy of Görlitz. In 1635 it passed to Saxony and was annexed to Prussia in 1815. Consult M. Kwiecinski, *Görlitz und seine Umgegend* (6th ed., Görlitz, 1899), and R. Jecht, *Incllen zur Geschichte der Stadt Gorlitz bis 1600* (ib., 1909).

GÖRLITZ TRIAL, The. A famous trial held in 1850 at Darmstadt, Germany, and pertaining to the mysterious death of a Countess Görlitz. It was asserted that her death was due to spontaneous combustion. Liebig and Bischoff declared that under no circumstances could a body in which the blood is circulating take fire. Consult Graff, "Ueber die Todesart der Gräfin Görlitz, nebst Gegenbeweis von Bischoff," in Henkes, *Zeitschrift für die Staatsarzneikunde* (Erlangen, 1850).

GOR'MAN, Arthur Pue (1839–1906). An American Democratic politician, born in Howard Co., Md., March 11, 1839. He was educated in the public schools and at 13 became a page in the United States Senate, which post he held for 14 years. He was collector of internal revenue in the Fifth District of Maryland in 1866–69. He was made general superintendent of the Chesapeake and Ohio Canal Company, and in 1872 its president. In the meantime he had been elected to the House of Delegates in Maryland in 1870; he held office until 1875, during the last part of his term serving as the Speaker. In 1875 he was elected State Senator and in 1881 United States Senator. By the grasp on parliamentary law which he had attained as a page, and his relentless methods, he quickly rose to a prominent position in his party. In 1884, as chairman of the Democratic National Committee, he was largely instrumental in electing Grover Cleveland President. He led the opposition to the Force Bill in 1889 and opposed the second nomination of Cleveland in 1892. Always an advocate of moderate protection, he became recognized as the leader of those among his party who favored that policy, and after the nomination of Bryan in 1896 an attempt was made to throw Gorman out of the party councils. This led to his defeat for reëlection in 1899, but after a lapse of three years he was again in the Senate for a fourth term, and in absolute control of the Democratic organization as chairman of the caucus. He attempted to disfranchise the Maryland negroes in 1904, and was prominently mentioned as a candidate for President. He died June 4, 1906.

GORMAN, Willis Arnold (1814–76). An American politician and soldier, born near Flemingsburg, Ky. He was educated in law at the University of Indiana, was admitted to the bar in 1825, practiced law for a number of years, served first as a major (1846) and then as a colonel (1847) in the Mexican War, commanding a battalion in the battle of Buena Vista. He was a Democratic member of the House of Representatives from Indiana in 1849–53, was Territorial Governor of Minnesota from 1853 to 1857, and practiced law at St. Paul from 1857 to 1861. On the outbreak of the Civil War he entered the Federal army as a colonel of Minnesota volunteers and became a brigadier general of volunteers in September, 1861. He left the service in 1864 and subsequently lived in St. Paul, serving as city attorney from 1869 until his death.

GOR'MAS, Count de. See Luna, A. de.

GOR'NER GLACIER. A large glacier in the Pennine Alps, lying on the north slope of Monte Rosa. It has a length of 9.4 miles and covers an area of 26.6 square miles, including the snow fields. The ice sheet averages about a mile in width. A fine view of the glacier is obtained from the Gorner Grat, a ridge rising from the right bank to a height of 10,290 feet.

GOROSTIZA, gō'rô-stē'sȧ, Manuel Eduardo de (1789–1851). A Mexican statesman and playwright. He was born at Vera Cruz, of which city his father was Governor, and early acquired fame through his comedies, the first of which is said to have been written by him at the age of 12. Entering the Spanish army, he fought in the war against Napoleon and reached the rank of lieutenant colonel. Banished on account of his liberal ideas, he agitated in favor of Mexican independence in London. After the establishment of the Mexican Republic he served as Minister to England, France, and the United States, where he concluded several important political and commercial treaties. In Mexico he filled the posts of Minister of Treasury and Foreign Relations, and director of the National Library. A list of his works was published in the *Catálogo de autoridades de la lengua* of the Spanish Academy. They include: *Don Dieguito* (1820); *Indulgencia para todos* (1818); *El Jugador* (1820); *Contigo pan y cebolla* (1833).

GÖRRES, gẽr'rĕs, Johann Josef (1776–1848). A German scholar and publicist. He was born at Coblenz, Jan. 25, 1776, studied at the University of Bonn, and, being of a very ardent temperament, threw himself into the revolutionary movement which then agitated Rhenish Prussia. He first dreamed of uniting the Rhenish provinces with France in pursuance of his ideal of a union of all civilized countries and advocated these ideas in two ephemeral newspapers. He, however, soon learned to detest Napoleon and, despairing of the cause of liberty, from 1800 to 1806 taught physics at Coblenz, then was tutor at Heidelberg very successfully, lecturing first on æsthetics and then on older German literature. In 1808 he returned to Coblenz and for two years (1814–16) edited another newspaper, the *Rheinischer Merkur*, the most important political journal published in Germany at that time, which breathed the most ardent German patriotism. But before long his opinions underwent another radical change, and, compelled to flee because his political views were not acceptable to the government, he took up a mystic and symbolic kind of religion in the same enthusiastic way. Always a Roman Catholic, he now became the church's aggressive champion. In 1826 he was called from exile in Switzerland to be professor of history in the University of Munich, and the next 20 years were the most productive of his life, during which he poured forth a mass of brilliant polemic papers on questions of the day. He died at Munich, Jan. 27, 1848. His principal publication is *Die christliche Mystik* (1836–42), which, though doubtless intended to set forth only views acceptable to the Roman Catholic church, as a matter of fact was regarded with so much aversion that it required all the King of Bavaria's influence to prevent its being put on the Index. His numerous political writings were collected (1854–60), and also his letters (1858–74). In English have appeared *Germany and the Revolution* (1820) and *The Stigmata: A History of Various Cases* (a part of his *Mystik*, 1883). Consult his biography by Galland (2d ed., Freiburg, 1876), and Franz Schultz, *Joseph Görres, als Herausgeber, Literarhistoriker, Kritiker* (Berlin, 1902).

GORRESIO, gŏr-rā′zē-ō, Gaspare (1808–91). An Italian Sanskrit scholar, born at Bagnasco, Piedmont, and educated at Turin and Vienna. He was professor in the military school at Turin from 1832 to 1838 and then went to Paris to study Sanskrit under Burnouf and later continued his linguistic studies in London. In 1852 the first chair of Sanskrit in Italy was established for him at Turin, and in 1859 he became librarian of the National Library in that city. His principal work, upon which he was engaged for nearly 30 years, is an excellent Italian translation of the *Râmâyana* (10 vols., 1843–58). He published also the *Uttarakanda, testo con note secondo i codici della recenzione Gaudana* (1867). For a brief biography, consult the article of Pizzi in the *Atti della Reale Accademia di Scienze*, vol. xlii (Turin, 1907).

GORRINGE, gôr′rĭnj, Henry Honeychurch (1841–85). An American naval officer. He was born in the island of Tobago, West Indies, the son of an English clergyman, and emigrated to New York in 1858, where he entered the merchant-marine service and by 1862 was master of a sailing vessel. In that year he entered the United States navy as master's mate. He was attached to the Mississippi squadron under Commodore Porter, and by 1865, through successive promotions for bravery and good service, attained the rank of acting volunteer lieutenant commander. In 1868 he was commissioned lieutenant commander in the regular service. He commanded the *Portsmouth* in the South Atlantic squadron from 1869 to 1871 and was engaged at the Hydrographic Office in Washington from 1871 to 1876; when he was sent with the *Gettysburg* to the Mediterranean Sea. In 1879 he was assigned the task of transporting from Alexandria, Egypt, to New York the obelisk popularly known as "Cleopatra's Needle," which the Khedive Ismail Pasha had presented to the United States. Gorringe accomplished the task with complete success, surmounting great engineering difficulties and showing considerable ingenuity in the contrivances he invented for moving the monolith. He resigned his commission soon afterward in consequence of a reprimand received from the Secretary of the Navy for too free criticism of naval matters and during the remainder of his life was engaged in extensive shipbuilding projects. He published *Egyptian Obelisks* (1882).

GORSE. See Furze.

GORST, Sir John Eldon (1835–1916). An English legislator, born at Preston and educated at St. John's College, Cambridge. He was civil commissioner of Waikato, New Zealand, from 1861 to 1863. In 1866–68 he was in Parliament as Conservative member for Cambridge University, from 1875 to 1892 represented Chatham, and from 1892 to 1906 sat again for Cambridge. He failed of reëlection in the latter year. He was appointed Solicitor General in 1885, and afterward was successively Undersecretary of State for India (1886–91); Deputy Chairman of Committees, House of Commons (1888–91); Financial Secretary to the Treasury (1891–92); rector of Glasgow University (1893–94); and vice president of the committee of the Council on Education from 1895 to 1902. After 1903 he actively opposed Mr. Chamberlain's tariff-reform proposals. He wrote *The Children of the Nation: How their Health and Vigor should be Promoted by the State* (1907) and *New Zealand Revisited* (1908).—His son, Sir Eldon Gorst (1861–1911), was educated at Eton and at Trinity College, Cambridge. After filling various posts he was appointed Secretary of Legation (1901), while acting as financial adviser to the Egyptian government (1898–1904), and subsequently he was Assistant Undersecretary of State for Foreign Affairs (1904–07), and British Agent and Consul General in Egypt (1907–11).

GORTCHAKOFF, gôr′chȧ-kôf′. A Russian family, tracing its ancestry to Vladmir the Great and Rurik.—Prince Peter Gortchakoff, Governor of Smolensk, defended that town for two years (1609–11) against Sigismund III of Poland, until it was taken by storm.—Prince Dmitri Gortchakoff (1756–1824) was a celebrated Russian poet and wrote odes, satires, and epistles.—Prince Alexander Gortchakoff (1764–1825) served under his uncle Suvaroff in Turkey and Poland, displayed great courage at the capture of Praga, a suburb of Warsaw, and was made lieutenant general in 1798. In the campaign of 1799 he commanded under Korsakoff at Zurich. He was made military governor of Viborg, repulsed Marshal Lannes at Heilsberg, and commanded the right wing of the Russian army at the battle of Friedland (1807). Appointed Minister of War in 1812, he filled this post to the end of the French War, when he was made general of infantry and member of the Imperial Council.—Prince Andrei Gortchakoff (1768–1855) served in 1799 as major general under Suvaroff in Italy and commanded in 1812 a division of grenadiers at Borodino, where he was wounded. In the campaign of 1813–14 he commanded the First Corps of Russian infantry and distinguished himself at Leipzig and Paris. He was made general of infantry in 1819 and in 1828 retired from active service.—Prince Peter Gortchakoff (1790–1868) fought against Napoleon in 1807 and 1817, later served in the campaigns of 1813 and 1814 in Caucasia under General Yermoloff. He took part in the Russo-Turkish War of 1828–29 and was one of the signers of the preliminaries to the Treaty of Adrianople. In 1843 he was appointed Governor-General of Western Siberia, and occupied that important post until 1851, when he retired from active life. On the outbreak of the Crimean War, however, he returned to service, and at the battle of the Alma commanded the left wing of the Russians. He also took part in the battle of Inkerman.—Prince Mikhail Gortchakoff (1795–1861), brother of Peter, began his military career as an officer of artillery and distinguished himself in 1828 at the siege of Silistria and at Shumla. In 1831 he gave proofs of extraordinary valor in the battle of Ostrolenka and at the taking of Warsaw. He was appointed general of artillery in 1843 and military governor of Warsaw in 1846. In 1853 he commanded the Russian forces in the Danubian Provinces, crossed the Danube at Braila, March 23, 1854, occupied the frontier region of Bessarabia, and in 1855 directed the defense of Sebastopol. As a reward for his services in this unsuccessful but still brilliant defense, Prince Gortchakoff was appointed by the Emperor Alexander II Governor of the Kingdom of Poland and was for several years a wise and conciliatory representative of his youthful Emperor at Warsaw. He died May 30, 1861.

Prince Alexander Mikhailovitch Gortchakoff (1798–1883), a cousin of the preceding, entered the diplomatic service and became one of the most skillful and influential diplomats in Europe. He was an attaché in the suite of Count Nesselrode at the congresses of Laibach and Verona, Secretary of the Russian Embassy in London in 1824, chargé d'affaires at Florence in 1829, counselor of the Russian Embassy at Vienna in 1832, and in 1841 was sent as Plenipotentiary to Stuttgart, where he negotiated the marriage of the Grand Duchess Olga, daughter of Emperor Nicholas, with Crown Prince Charles of Württemberg. He was accredited Ambassador to the German Bundestag at Frankfort in 1850, and there first met Bismarck. He represented Russia at Vienna from 1854 to 1856, and so conducted affairs that Alexander II made him Minister of Foreign Affairs on the retirement of Nesselrode, April 15, 1856. At the very outset hostility to Austria seemed to be the impelling motive of his policy. "Austria," he declared, "is no state, only a government," and he shaped his policy in accordance with his dictum, after the disastrous issue of the Crimean War, "La Russie ne boude pas, elle se recueille" (Russia bears no grudge; she collects herself). He was unquestionably successful in restoring the prestige of Russia. In 1863 he was made Chancellor of the Empire. During the Civil War in the United States he maintained a friendly attitude towards the North, a fact which restrained France and England from open countenance of the Confederacy. By bringing Russia into accord with Prussia in 1863 he was able to resist the attempted interferences of foreign powers in behalf of the Polish insurgents. He cultivated friendly relations with Bismarck while the latter was Prussian Ambassador at St. Petersburg, and the good understanding between the two governments made possible the attainment of German unity through Prussia's drastic course, while Russia reaped her reward by being enabled to break the terms of the Peace of Paris, extorted from Russia at the close of the Crimean War in 1856, to the extent of gaining control of the mouths of the Danube and admitting the Russian war fleet to the Black Sea. After 1873 Gortchakoff ceased to view with favor the much talked of alliance of the three emperors, because of the increasing power of Germany. He was the guiding spirit of Russian policy in the war with Turkey in 1877–78, and the diplomatic consequences of that war widened the breach between the two great chancellors and their governments. Gortchakoff felt that Russia had been deserted by Germany in the negotiations at Berlin, and he never forgot it. He was the author of the Franco-Russian *entente*, to which Bismarck responded by the Triple Alliance. De Giers succeeded Gortchakoff as Minister of Foreign Affairs in 1882, but the latter remained Chancellor until his death at Baden-Baden, March 11, 1883. Prince Gortchakoff's biography, by Charles Marvin, was published in London (1887). Some interesting observations on Gortchakoff and his diplomatic methods are to be found in Bismarck's *Autobiography*, trans. by Butler (New York, 1899). Consult also Klaczko, *The Two Chancellors*, trans. by Tait (New York, 1876), and Alfred Rambaud, *A Popular History of Russia*, vol. iii (Boston, 1882). See Russia; Russo-Turkish War.

GOR'TON. A suburban municipality of Manchester (q.v.), Lancashire, England. Pop., 1901, 26,550; 1911, 40,578.

GORTON, Samuel (1592–1677). One of the founders of Rhode Island, born at Gorton, England. For a time he was a clothier in London; but having adopted radical religious opinions, he left in 1636 for Boston, Mass. There his participation in religious discussions led to trouble; so he went to Plymouth and began to preach; but in 1838, leading the opposition to certain political measures of Governor Prence, he was banished from Plymouth. He then removed to Pocasset (now Portsmouth), Aquidneck (now Rhode Island). When William Coddington became Governor, Gorton was denied the island, but he found protection at Providence with Roger Williams (1640). Thence in 1642 he went to the other side of Narragansett Bay and bought the lands owned by the Indian chief Miantonomi at Shawomet, now Old Warwick. His claim was disputed by other Indian chiefs, and, the dispute being referred to the Boston authorities, 40 soldiers were sent, who took Gorton and eight of his people prisoners. They were tried at Boston on a heresy charge and sentenced to hard labor in chains (1643). Five months afterward (March, 1644) they were released and at once left the Colony. Gorton then returned to England and obtained from the Parliament Commissioners a mandate protecting his land claim. He returned in 1648, named the place Warwick, and thenceforward lived in peaceful possession. In 1651–52 he was president of Providence and Warwick, and he held numerous other offices. He was an author and published *Simplicitie's Defense Against Seven-Headed Policy* (1646; reprinted in Peter Force, *Collection of Historical Tracts*, Washington, 1846); *An Incorruptible Key Composed of the CX. Psalm Wherewith You May Open the Rest of the Holy Scriptures* (1647); *An Antidote Against the Common*

Plague of the World (1657): and other works. He died at Warwick between Nov. 27 and Dec. 10, 1677. A sect of which he was the founder, though few in number, existed for about 100 years. Its distinguishing tenets were contempt for the regular clergy and the outward forms of religion, and the belief that the true believers were so united to God that they shared in His perfection, and for them heaven and hell were practically nonexistent. The emphasis laid on negations by Gorton's followers led to their being called the Nothingarians. Consult Janes, *Samuel Gorton* (Providence, 1896), and A. Gorton, *Life and Times of Samuel Gorton* (Philadelphia, 1907).

GORTY'NA (Lat., from Gk. Γόρτυνα). An ancient city of importance on the southern side of the island of Crete, now called Gortyn. It stood on the banks of the small river Lethæus (Mitropolipotamo), at a short distance from the sea, with which it communicated by means of its two harbors, Metallum and Lebena. It possessed temples of Apollo Pythius, Artemis, and Zeus. Near the town was the famous fountain of Sauros, inclosed by fruit-bearing poplars; and not far from this was another spring, overhung with an evergreen plane tree which in popular belief marked the scene of the amours of Jupiter and Europa. Gortyna was the second city in Crete, next to Cnosus in importance. According to tradition, Cnosus and Gortyna combined to subdue the island and then quarreled with each other. Neither plays a conspicuous part in the history of Greece. Under the Romans Gortyna became the metropolis of Crete. Some ruins may still be traced at the modern village of Hagii Deka. An important inscription (Greek) was discovered here in 1884. by Halbherr and Fabricius. in the bed of a mill stream. The main body of the inscription was on a wall 27 feet long and 5 feet high. Taken with two fragments previously discovered in 1857 and 1859, by French archæologists, and 80 others which came to light in 1885, the inscription forms a practically complete code of laws, bearing on the family relations in regard to such matters as inheritance, marriage, divorce, and adoption, and on matters of bargain and sale. The inscription is written alternately from right to left and left to right (*boustrophedon*) in a peculiar local alphabet and in the local dialect. In spite of these marks of antiquity it is not likely that the main inscription can be dated much earlier than 400 B.C.; the fragments discovered in 1885 may belong to the seventh century B.C. There is a cast of the main inscription in the Cambridge (England) Museum of Classical Archæology. Consult: Bücheler and Zitelmann, *Das Recht von Gortyn* (Frankfurt, 1885); Baunack, *Inschrift von Gortyn* (Leipzig, 1885); Merriam, in *American Journal of Archæology*, vols. i and ii (Baltimore, 1885–86), with translation and notes; Gardner-Jevons, *Manual of Greek Antiquities* (2d ed., London, 1898); Wyse, in Whibley's *Companion to Greek Studies* (Oxford, 1905): Lipsius, *Zum Recht von Gortyns* (Leipzig, 1909): Kohler and Ziebarth, *Das Stadtrecht von Gortyn und seine Beziehungen zum gemeingriechischen Recht* (Göttingen, 1912). For excavations at Gortyna in 1912 which yielded two more blocks of the great inscription, consult Tonks, "Archæology," in *The New International Year Book* (1912). See COMPARETTI.

GORTYNIAN LAW CODE. See GORTYNA.

GÖRTZ, gẽrts, GEORG HEINRICH VON. See SCHLITZ.

GORUP-BESANEZ, gō'rụp bå-zä'nĕts, BARON EUGEN (1817–78). A German chemist, born at Graz and educated in that city and at Vienna, Padua, Munich, and Göttingen. He was appointed assistant in 1849 and regular professor of chemistry at Erlangen in 1855. His researches on zoöchemical analysis are important, and his work entitled *Anleitung zur qualitativen und quantitativen zoöchemischen Analyse* (3d ed., 1871) is very valuable. His principal publication is the *Lehrbuch der Chemie* (vol. i, 7th ed., 1885; vol. ii, 6th ed., 1881; vol. iii, 4th ed., 1878), which has been translated into French and several other languages.

GÖRZ, gẽrts, or **GÖRITZ,** gẽ'rĭts. The capital of the Austrian Crownland of Görz and Gradisca, one of the coast districts, charmingly situated in a fruitful plain on the left bank of the Isonzo, about 35 miles north-northwest of Triest (Map: Austria, C 4). It is the seat of an archbishop. Among its principal buildings are the cathedral of the seventeenth century, with a beautiful sacrarium; the church of St. Ignatius and college of the Jesuits, the latter used as barracks; the Archbishop's palace; and government buildings. Above the town rises the dilapidated old castle of the former counts of Görz, now used as barracks; and to the north lies the Franciscan monastery of Castagnavizza, with the graves of Charles X of France, who died in Görz in 1836, of the Duc d'Angoulême, and of the Comte de Chambord. Owing to its fine climate, it has become a favorite health resort, and is now called "the Nice of Austria." Its institutions include a gymnasium, a theological school, a teachers' seminary, an agricultural school, an agricultural-chemistry experiment station, and a public library. Görz has manufactures of silks, cotton, thread, dyed goods, breadstuffs, pottery, candles, kindling wood, leather, matches, candles, paper, and soap, and a thriving trade in vegetables, candied fruits, and wine. Pop., 1900, 25,432; 1910, 30,995.

GÖRZ AND GRADISCA, grȧ-dĭs'kȧ. A crownland and princely earldom of the Austrian portion of Austria-Hungary, bounded on the north by Carinthia, east by Carniola, south by the Adriatic and the districts of Triest and Istria, and west by Italy. Area, 1140 square miles. It is mostly a mountainous region. The southwestern part, on the Adriatic, is wholly arable and very fertile, but has no good harbors. In the north the Julian Alps cross in a southeasterly direction, with the Triglav group (9394 feet) rising on the east boundary; in the west the Venetian Alps extend southward, forming most of the west boundary, with Monte Canin (8469 feet) as the highest peak. The two important rivers are the Isonzo, which empties into the Adriatic, and the Timavo, which flows into the Gulf of Triest. Agriculture and culture of the vine are the leading industries. Silk is also produced in the south. Wheat, barley, maize, rice, buckwheat, and hay are raised. Capital, Görz. The local diet has 22 members. The crownland sends five members to the Lower House of Austria. Pop., 1900, 232,897; 1910, 261,721. The inhabitants are almost wholly Roman Catholics. The district came into the possession of Austria in 1500, on the extinction of a line of counts of Görz and Gradisca, who had ruled for some centuries.

GÖSCHEL, gẽ'shel, KARL FRIEDRICH (1784–

1862). A German jurist and philosopher. He was born at Languensalza and was educated for the bar at Leipzig. In 1845 he was appointed president of the consistory for the Province of Saxony, Prussia, but was compelled to resign that position after the revolution of 1848. He was not only a scholar and theorist, but also a practical legislator, both in ecclesiastical and secular matters. Conservative in his religious views, Göschel exerted considerable influence upon the Protestant church in his day and, above all, was instrumental in establishing the relation between theology and the Hegelian philosophy. His works include: *Aphorismen über Nichtwissen und absolutes Wissen* (1829); *Der Monismus des Gedankens* (1832); *Von den Beweisen für die Unsterblichkeit der menschlichen Seele* (1835); *Vorträge und Studien über Dante* (1863).

GOSCHEN, gō′shen, George Joachim Goschen, first Viscount (1831–1907). An English statesman. He was educated at Rugby and Oriel College, Oxford. Entering the mercantile firm of Frühling and Goschen, he paid especial attention to finance and in 1856 became a director of the Bank of England. A Liberal member of Parliament for London from 1863, he took an active share in throwing open the universities to dissenters and in bringing about the abolition of religious tests. He was reëlected in 1865. He became a privy councilor and vice president of the Board of Trade in 1865, and in the following year Chancellor of the Duchy of Lancaster and Cabinet Minister, but retired with the Russell ministry in June of that year. On Gladstone's accession to power in 1868, Goschen was appointed president of the Poor Law Board and in 1871 First Lord of the Admiralty. He retired from office with his party in 1874, and in the election of this year he was the only Liberal candidate returned from the city of London. In the same year he became lord rector of Aberdeen University. Two years later he and M. Joubert went as delegates to Cairo, where they planned with the Khedive the conversion of the Egyptian debt. In 1880 and 1881, as special Ambassador to the Porte, Goschen lent his services to the settlement of the Græco-Montenegrin boundary. Because of his opposition to Gladstone on the extension of the franchise and on home rule for Ireland, he abandoned the Liberal party for that of the Liberal Unionists (q.v.) in 1886 and accepted the office of Chancellor of the Exchequer in Lord Salisbury's government after the resignation of Lord Randolph Churchill. In 1895 he again became First Lord of the Admiralty; he resigned in 1900, was created Viscount, and entered the House of Lords. He became rector of Edinburgh University in 1890 and chancellor of Oxford University in 1903. He published *The Theory of Foreign Exchanges* and a life of his grandfather, G. J. Göschen, the noted German publisher (1903).

GOSCHEN, Sir William Edward (1847–). An English diplomat, brother of the first Viscount Goschen. He was born in London, was educated at Rugby and Oxford, and entered the diplomatic service as attaché in 1869. He was Third Secretary at Buenos Aires (1873) and Paris (1875) and Second Secretary at Rio de Janeiro (1877), accompanied his brother to Constantinople in 1880, and served as Secretary of Legation in Peking (1885), Copenhagen (1888), Lisbon (1890), Washington (1893), and St. Petersburg (1894). He was Ambassador at Belgrade in 1898–1900, at Copenhagen in 1900–05, and, after three years in Vienna, was in 1908 promoted to the even more important post of Berlin. At the opening of the great European conflict of 1914 he returned to England.

GOS′HAWK (AS. *gōshafoc*, goose hawk, from *gōs*, goose + *hafoc*, *heafoc*, hawk). A genus of falcons (*Astur*) containing five or six species, distinguished from the true falcons by a lobe or festoon instead of a sharp tooth, on the edge of the upper mandible, and by the shortness of the wing, which reaches only to the middle of the tail. It is more closely allied to the sparrow hawks. The species to which the name "goshawk" originally belonged (*Accipiter palumbarius*, or *gentilis*) is very widely diffused over Europe, Asia, and the north of Africa, chiefly inhabiting hilly and wooded regions. It is now very rare in Great Britain, particularly in England. Although one of those that were called *ignoble birds* of prey, it was much used for falconry, being easily trained, and very successful in catching such game as is confined to the ground. The goshawk was thus flown at hares, rabbits, pheasants, partridges, etc. It was also flown at geese, whence the name "goose hawk." It ordinarily seeks its prey by flying near the ground and can remain a very long time on the wing. It follows its prey in a straight line, not rising in the air to descend upon it, like the falcons; and when baffled by the object of pursuit entering a wood and hiding itself in some covert, will perch on a bough and await its reappearance with wonderful patience for many hours. Its flight is very rapid. The goshawk builds a large nest in trees. The female, much larger than the male, is about 2 feet in entire length.

The American goshawk (*Astur atricapillus*) differs from that of the Old World, being altogether a larger and handsomer hawk. The upper parts are dark bluish-slate color, while underneath it is whitish, closely barred, or vermiculated with fine zigzag lines of brown. The young birds have a much less handsome plumage. The goshawk is chiefly a winter visitor in the northern United States, but breeds in the Rocky Mountains from Colorado northward. It is the most abundant of the birds of prey in Alaska, where many remain through the winter, and subsists partly by robbing the Eskimo hunters' snares, though mainly by capturing ptarmigan for itself. See Plate of Falcons and Falconry.

GO′SHEN. The name of a land given by Pharaoh to Jacob and his family when they came to Egypt, and occupied by their descendants until the Exodus (Gen. xlv. 10, xlvi. 28, 34, xlvii. 27, l, 8; Ex. ix. 26). According to Gen. xlvi. 34, Goshen was outside of Egypt. This is also suggested by Josh. x. 41, xi. 16, where the land of Goshen is spoken of in connection with the Negeb (q.v.) and the Philistine Shephelah as a part of the conquests of Joshua. The Greek version rendered the name Γέσεμ, Gesem, evidently identifying it with the Kesem, or Kes, of Ptolemaic times, also called the Arabian nome, with its capital at Phakusa, the Egyptian pa-Sept, the modern Saft el Henneh. Naville, Müller, and Wiedemann accept this view and look for the land of Goshen in the district around Saft el Henneh, east of the canal Abu'l Menagge and extending north of the Wadi Tumilat so as to include both the twentieth and the eighth nome with Bubastis, Belbeis, and Abasseh. It is not improbable, however, that this district, which in the time of Seti I (1319–10 B.C.) was a marshland, formed only the part of Goshen that was nearest to Egypt, and that the name was used by the Hebrews to designate the whole country between the Brook of Egypt (Wadi el 'Arish) and the Nile delta. As the name "Mizraim" (Egypt) was also employed so as to include this region, Goshen might be said to be in Egypt in the wider sense as well as outside of Egypt in a narrower sense. When it is described as "the best of the land" (Gen. xlvii. 6, 11), this is to be understood as referring to the needs of a pastoral or seminomadic people. Consult W. Max Müller, *Asien und Europa nach den ägyptischen Inschriften* (Leipzig, 1893); id., art. "Goshen," *Encyclopædia Biblica* (New York, 1901); Naville, *The Shrine of Saft el Henneh and the Land of Goshen* (London, 1888); Wiedemann, in Guthe's *Kurzes Bibelwörterbuch* (Tübingen, 1903); J. G. Duncan, *Exploration of Egypt and the Old Testament* (New York, 1909); H. Brown, *The Land of Goshen and the Exodus* (2d ed., London, 1912).

GOSHEN. A city and the county seat of Elkhart Co., Ind., 110 miles east of Chicago, Ill., on the Lake Shore and Michigan Southern and the Cleveland, Cincinnati, Chicago, and St. Louis railroads, and on the Elkhart River (Map: Indiana, F 1). The city contains Goshen College, a Carnegie library, city hospital, and a fine high-school building. It has important agricultural and lumber interests and extensive manufactures, which include flour, rubber goods, ladders, iron, condensed milk, buggies and wagons, steel tanks, underwear, machinery, sash and doors, veneering, furniture, and farm implements. Goshen is governed by a mayor, elected every four years, and a unicameral council. The water works and an electric-light plant are owned and operated by the city. Pop., 1900, 7810; 1910, 8514; 1914 (U. S. est.), 8813.

GOSHEN. A village and the county seat of Orange Co., N. Y., 60 miles northwest of New York, on the Erie and the Lehigh and New England railroads (Map: New York, A 1). The centre of an agricultural region, it has a large trade in milk and cheese. There are cut-glass works, foundries, a road-cart factory, and a cider mill. The village contains a public library, a hospital, and a sanitarium. Goshen was settled in 1714 and first incorporated in 1809. The government, under a general Act of 1897, is vested in a president and board of four trustees, who are elected at the annual corporation meeting. The village owns and operates its water works. Pop., 1900, 2826; 1910, 3081.

GOSIUTE, gō′shĭ-o͞ot (from *Gossip*, their chief + *Ute*). A Shoshonean tribe, formerly ranging west of Great Salt Lake, Utah, and later assimilated by the Piute (q.v.).

GOSLAR, gō̇′slär. An ancient Imperial city of Germany, in the Prussian Province of Hanover, situated on the Gose at the foot of the Rammelsberg, about 35 miles south of Brunswick (Map: Prussia, D 3). Its ancient buildings give it a very mediæval appearance. These include the Zwinger, a tower with walls 20 feet thick; the Gothic Rathaus, with a valuable collection of old books, paintings, and other antiquities; the tailors', butchers', and bakers' guild houses, the Romanesque twelfth-century church of the Neuwerk Monastery, with good mural paintings; the Frankenberg Church, built at the beginning of the twelfth century and restored in 1873, with tombstones and sculptures; and the cathedral chapel, with a splendid altar. It was formerly the vestibule of the historical cathedral of St. Simon and St. Jude, founded in 1045 and destroyed in 1820, and contains many relics of interest to the antiquary. The Kaiserhaus, the most ancient secular building in Germany, built in 1039, is a restored palace founded by Henry III. Its large Imperial hall is enriched with historical frescoes by Wislicenus and contains an ancient Imperial throne dating from the twelfth century. The double chapel of St. Ulrich, a portion of the original building, holds the tomb of Henry III, with his heart. Among its institutions are a gymnasium, a teachers' institute, and several sanitariums.

The chief industry of Goslar is mining. It manufactures polished marble, matches, chemicals, starch, playing cards, cigars, hats, dyes, cut glass, brandy, and beer. In the vicinity are situated a number of ponds from which ochre dye is obtained. The Rammelsberg Mountain (2040 feet) has been mined for centuries, produces silver, copper, lead, zinc, and gold ores, and is a source of much interest to tourists. Pop., 1900, 16,403; 1910, 18,909, chiefly Protestants. Goslar was founded probably early in the tenth century and soon became important on account of its rich mineral deposits. It was a favorite place with the Saxon and Franconian emperors and the seat of many diets. For its adherence to the Hohenstaufen it was destroyed by Otho IV in 1204, but it recovered its prosperity after joining the Hanseatic League. It suffered during the Thirty Years' War and was burned in 1728 and 1780. Attached to Hanover in 1816, it finally became Prussian in 1866.

GOSLAWSKI, gȯ-släv′skė, MAURYCY (1802–34). A Polish poet, born in Podolia. He was educated at Kremenetz and composed his famous war songs as a soldier during the revolution of 1830. These were subsequently collected and published under the title *Poezya Ulana polskiego poswiecona Polkom M. Goslawski* (Poems of a Polish Uhlan, 1833). Sent as an emissary to Galicia from Paris, whither he had fled in 1833, he was arrested by the Russian authorities and imprisoned at Stanislau, where he died, and where a monument was erected to his memory in 1875. His complete works were published by Brockhaus in 1864 under the title of *Poezye.*

GOS′NELL, R. EDWARD (1860–). A Canadian archivist and author. He was born at Lake Beauport, Province of Quebec, was early a public-school teacher and in newspaper work, and went in 1888 to British Columbia, where, after two years on the staff of the Vancouver *News-Advertiser,* he was appointed a commissioner to exhibit the products of the province. In 1893 he became librarian and secretary of the provincial bureau of statistics, and later he edited the Victoria *Colonist* for some years. He was made provincial archivist and secretary of the British Columbia Forestry Commission, was actively interested in the cause of Imperial federation, becoming a member of the British Empire League in British Columbia, and in 1907 was a delegate to the Conference on Education in London, England. He edited the *British Columbia Year Book.* His publications include *Some Practical Phases of a Great Question* (1901) and, with R. H. Coats, *The Life of Sir James Douglas* (1905), in the "Makers of Canada Series."

GOS′NOLD, Bartholomew (?–1607). An English navigator and one of the earliest explorers of New England. He sailed for America in March, 1602, with a party of colonists in the *Concord.* The expedition seems to have been supported by Sir Walter Raleigh. Gosnold made land somewhere on the coast of Maine, sailed south along the coast, and discovered and named Cape Cod, Martha's Vineyard, and Elizabeth Island. This last, now known as Cuttyhunk, was made a base for trading operations, which were carried on in Buzzard's Bay for a few weeks. The idea of a permanent settlement, to found which was one of the objects of the voyage, was soon abandoned, and in July the *Concord* was once more in England with a cargo of cedar, furs, and sassafras. In 1606—largely through Gosnold's efforts—an association of London and West of England merchants obtained a charter from James I for colonizing Virginia. Three ships sailed under Capt. Christopher Newport (1607). The expedition discovered and named Cape Charles and Cape Henry and founded the settlement of Jamestown. Gosnold was among those appointed by the King to the council of the Colony, and he was one of the many who succumbed to illness in the early months of the experiment. He died on Aug. 22, 1607. For the contemporary account of Gosnold's voyages and the settlement of Virginia, consult Arber's edition of the *Works of John Smith,* in the "Scholar's Library" (London, 1884), and Stevens's reprint of Brereton, *Brief and True Relation of Gosnold's Voyage* (ib., 1901). See Cuttyhunk.

GOS′PEL (AS. *godspel, godspell,* OS. *godspell,* OHG. *gotspel,* the *o* being originally long, and meaning thus *gōd,* good + *spel,* tidings, a translation of Gk. *εὐαγγέλιον, evangelion,* good tidings, from *εὖ, eu,* well + *ἀγγέλλειν, angellein,* to announce. Through the shortening of the *o,* in popular speech, before the three consonants, the word took the form *gŏdspel,* God story, the story of Christ. To this form the OS. and OHG. belong). The word used to denote (1) the message of salvation given to the world by Jesus Christ, and (2) the historical record of this message as contained in the first four books of the New Testament, so that each of these books is designated a Gospel, and the collection is known as the Gospels. The term, as used in the earlier books of the New Testament, has an active sense, best expressed by the phrase "the preached gospel." This was due to the missionary character of the initial proclamation which was given by the Apostles to the message of salvation. It is frequently so used in Paul's Epistles (e.g., 1 Thess. iii. 2; Rom. i. 1–3, 9, 16; Phil. i. 5, 12, ii. 22, iv. 3). In the later books the term is used sometimes in a technical sense, denoting the historical record of this salvation message (e.g., Mark i. 1), or even the message itself as an article of faith and confession (e.g., Rev. xiv. 6). This technical sense was fully acquired by the end of the second century. Its primary sense is seen in such passages as Mark i. 14, 15, xiii. 10, xiv. 9; Matt. iv. 23, ix. 35, xxiv. 14, xxvi. 13; Gal. i. 11, ii. 2; 1 Cor. xv. 1; 2 Cor. xi. 7; Rom. x. 16.

The following article naturally confines itself to the term as denoting the historical records of the Gospel message, the New Testament books commonly known as the Gospels. Of these Gospels, the first three (Matthew, Mark, Luke) cover practically the early portion of Jesus' life, i.e., His ministry in Galilee and the north, together with the close of His life in Jerusalem, recording largely the same events and reproducing largely the same teachings. For this reason they are technically known as the *Synoptic Gospels,* and the question of their literary relation to one another and to common and specific sources is known as the *Synoptic Problem.* Their origin dates within generally the same period, say from 65 to 80 A.D. The Fourth Gospel (John) covers the later portion of Jesus' life—i.e., His ministry in Judæa and Jerusalem, not only on the occasion of His visits to the city before and at the close of His Galilean ministry, but especially during His closing ministry in that city and region—recording events and reproducing teachings largely different from those given in the Synoptic Gospels. For this reason the literary relation of the Fourth Gospel to the Synoptic Gospels constitutes in itself a specific problem known as the *Johannine Problem,* or the Problem of the Fourth Gospel. The origin of the Fourth Gospel dates from a period much later than those of the Synoptists, say about 90 A.D. The discussion of these two problems has enlisted the interest of most New Testament scholars and has really gathered around itself the most significant New Testament work which has been done in the last 50 years. More definitely stated, these problems are as follows:

I. **Synoptic Problem.** Our first three Gospels present such striking identities in their order of narrative and in their use of word, phrase, and continued statement, and at the same time such striking differences in these respects, that we are compelled to ask what theory of their origin will account for these phenomena. The following theories have been propounded: (*a*) the *Successive Dependence Theory,* viz., that the evangelists made use of one or more of the Gospels already written, so that one of the Gospels is the first and original Gospel—a second writer using the first, and the third using one or both of his predecessors. This is the oldest view, having practically originated with Augustine, and has been worked out into every possible modification. (*b*) the *Documentary Theory,* viz., that all three Gospels to some extent made use of a preëxisting written source. This theory came from ideas suggested by Le Clerc (1716) and was later taken up by Priestly (1777) and finally definitely formulated by Lessing (1778). This also has received many modifications, according to the view held as to the character of the original document and also according to the way this theory was combined with the first. (*c*) the *Oral Theory,* viz., that all three Gospels made use of the common oral tradition, which had become fixed by use. This was first suggested by Herder (1797) and Eckermann (1806), but fully formulated by Gieseler (1818). It has also been variously modified, according as there have been held to enter into the oral sources written sources as well, or as the Gospels have been held to have undergone various recensions which the evangelists have used in varied combinations.

The conclusions most generally accepted by critics to-day lie within the general sphere of the Documentary Theory, though they involve elements of each of the others. In substance they are, that behind our present canonical

Gospels lay two fundamental written sources: one a collection of sayings of Jesus, known as the *Logia* of Matthew—referred to to-day by the more general term *Quelle* (Source), represented by the symbol *Q*—and present most conspicuously, if not exclusively, in our first and third Gospels; the other a narrative of the events of Jesus' ministry, which is practically, if not absolutely, identical with our second Gospel. Besides these main sources, it is held that the writers of the individual Gospels had access to special sources peculiar to themselves; while the writer of the third Gospel is held by some to have made use of the first as well as the second, though there are others who account for the material common to the first and third Gospels on the theory that they made use of common documents apart from *Q* and not accessible to the second Gospel. Recently the theory has been advanced in Germany that the two main documents referred to above are not primary in character, but composite results of multiple sources whose origin is often, if not always, impossible to trace.

II. **The Problem of the Fourth Gospel.** Generally the problem has been centred on the contrasts disclosed between the Fourth Gospel and the Synoptics. The narrative scheme of the Fourth Gospel differs from that of the Synoptics, not only in the portion of the ministry which it specially covers, but in the shifting of incidents common to both schemes; while incidents are introduced in the Fourth Gospel the omission of which on the part of the Synoptics is difficult to understand, and others are omitted which would be reasonably expected on the part of the Fourth Gospel. In the discourses of Jesus there is an even more radical difference. (*a*) The Synoptics present the discourses as simple talks on the level of everyday speech; the Fourth Gospel as involved discourses beyond the range of ordinary speech. (*b*) The Synoptics give the discourses largely in the form of parable—as the Sower, the Lost Sheep, the Prodigal Son; the Fourth Gospel gives them largely in the form of allegory—as the Water of Life, the Light of the World, the Good Shepherd. (*c*) In the Synoptics the subject of the discourses is, generally speaking, the varied and practical topics of religious living—as in the Sermon on the Mount, the qualities of the Christian life and character; or, as in the great Parable Discourse, the nature and growth of the Kingdom of God. In the Fourth Gospel, to an almost exclusive extent, Jesus Himself is made the subject of the discourses, and this self-subject is treated almost wholly from the point of Jesus' transcendental relations to the Godhead. The problem so presented has been sought to be solved, on the one hand by harmonizing the contrasts between the Fourth Gospel and the Synoptics, as both of first-century origin; on the other hand by accepting them as evidence of a second-century origin of the Fourth Gospel. Recently, however, it has come to be recognized that the problem is too complicated to be settled on the basis of the contrasts between the Fourth Gospel and the Synoptics. The Synoptic narrative cannot be accepted as a standard of completeness or accuracy as to Jesus' ministry, or the Synoptic discourses as the only form of address possible on Jesus' part. The problem thus resolves itself into the question, not only as to the extent to which the Fourth Gospel discourses are supposable on the part of Jesus, but also as to how far reliable historical tradition underlies the framework of facts which the Fourth Gospel presents.

In addition to these main problems of the Gospels, there are the following minor ones:

A. **The Problem of the Contents.** Involved in this problem are the following principal points of present-day criticism:

(*a*) *The Nativity.*—This is given in but two of the four Gospels, Matthew (i. 18–ii) and Luke (i. 5–ii. 39), and is presented by them in narratives differing largely from each other. The one in Luke is the fuller and gives every evidence of having been derived from written Aramaic sources; the one in Matthew gives the impression of having come from oral sources. The chief question of debate is whether these sources rest upon historical fact or are the product of idealizing tradition. Against their acceptance as historical is the difficulty that during the period of the Gospel history there seems to have been no popular, nor even disciple, knowledge of them, the significance of which fact is heightened by the absence of all reference to them in the New Testament epistolary literature. In addition to this, are difficulties in the narratives as they stand—particularly the lack of full harmony in their record of events, as seen in the return of the family to Nazareth; the singular agreement which they bear at points to the national Messianic expectations which were never realized—as seen in the angel announcement that the Child was to ascend the throne of David and reign over the house of Jacob forever; and the poetic elaboration of certain parts—as seen in the songs of Mary and Zacharias. On the other hand, against the interpretation of the narratives as idealizations, there is the difficulty of the necessary assumption of a remarkably early date for the process. Neither Matthew nor Luke was written much, if at all, later than 75 A.D.; and yet at the time of their writing this tradition was not only popularly received, but had come into the elaborated documentary form represented in Luke. Such idealization further must have been of a distinctively Gentile origin. With his high conception of the holiness of the married state, the Jew would not consider supernatural birth necessary for an ideal—in fact, did not so interpret the prophecy of the virgin birth (Isa. vii. 14)—while his severely monotheistic idea of God would render a birth brought about by divine paternity hopelessly foreign to his mind; and yet, on the part of the Gentile, the crude sensuality of supernatural birth in pagan mythologies would make the creation and acceptance of such a tradition regarding Jesus within the Christian Church most difficult of accomplishment; while the origin of the narratives in Oriental myths is critically improbable, in view of the fact that these myths present no analogy to the virgin element in the narratives and that there is absolutely no trace of any process of a pre-Christian development of them which would render possible their final incorporation in the Gospels. Of the problem thus presented there may be no complete solution, though there is nothing in it which renders impossible the acceptance of the essential fact of a miraculous birth. On the contrary, the difficulty of the Gospel and Epistle silence regarding the event, and the difficulty gathering around the presence in the narratives of unfulfilled Jewish ideals, favor the historical character of the record; since, not only in proportion as the peculiar privacy of the event and the singular suspicion likely to attach to it in the popular mind are appreciated does the lack of publicity given become intelligible, but in proportion as the narratives record a form of announcement which agrees with the stage of Messianic expectations belonging to that beginning time of Gospel history, they show their primitive character, whatever poetic elaborations or harmonistic difficulties they present; while in proportion as the main idea of the supernatural conception which the narratives contain was unnatural to Jewish thought and unlikely of Gentile production or of Oriental derivation, they show an element accounted for only on the assumption of actual fact.

(*b*) *The Lord's Supper.*—This is recorded by each of the Synoptists, all of whom agree in placing it at the time of, and in connection with, the regular Passover meal. Mark and Matthew, however, agree as against Luke at two points: (1) as to the sequence of the bread and the cup—Mark and Matthew placing the bread first, Luke placing the cup both first and last; and (2) as to the permanence intended in the observance of the meal—Luke making Jesus purpose it as a subsequent memorial of Himself, Matthew and Mark recording no such intention on Jesus' part. At the same time the Synoptists come into definite relation to the narrative of the Passion Week as given by the Fourth Gospel, involving the time of the Supper and its relation to the regular Paschal meal—the Synoptists placing the Supper on the Feast day and making it identical with the Paschal meal, the Fourth Gospel placing the Supper before the Feast day and out of all association with the meal. In addition, account must be taken of the fact that Paul has given us, in 1 Cor. xi. 23–26, a definite statement of the institution of the Supper, which, in proportion as it is earlier than the Gospel narratives could be, takes precedence of the Synoptic records. This Pauline statement agrees with Luke—though only to a very slight degree when the text of the Gospel is relieved of its errors—and thus diverges from Mark and Matthew in its distinct mention of the cup being after the Supper, and of Jesus' purpose that the observance of the meal should be a permanent one with His disciples. In fact, it is quite clear from the character of the account of Luke that, in its statement of the after cup and of Jesus' purpose, it is derived from Paul, who in his statement further diverges from all the Gospels in evidently associating together the Supper and the ordinary religious meal of the Church—the Agape—if he does not actually identify them.

The problem presented is consequently twofold: (1) Was the Supper observed before the regular Passover feast and as a meal distinctly different from it, or at the close of the feast and as a meal definitely associated with it? and (2) Was its observance intended by Jesus to be a permanent one or to be exhausted in the event of that night? As to the first point, in case the dating of the Fourth Gospel is to be taken as correct, that part of the Synoptic narrative which connects the supper with the Passover feast (Mark xiv. 12–16 and parallels, including Luke xxii. 15) must be regarded as a modification of the original tradition, due to the Church's early identification of the two meals, while the Supper itself must be understood as an ordinary Jewish meal, the bread and wine of which Jesus symbolically refers to Himself. It has been held that in case the dating of the Synoptics is to be accepted, the Fourth Gospel's chronology is to be regarded as distorted by its author, either through ignorance or for partisan reasons, and the Supper itself understood as identified in time and meaning with the regular Passover feast. But it is now recognized that the record of the Synoptics is not consistent with their placing of the meal, but betrays the fact that it could not have occurred on the Feast day, as it must have done if it was identical with the Paschal feast. In either case, however, it is to be noted that all four Gospels agree in placing Jesus' death on Friday, and that the significance recorded by the Synoptists and Paul as attached by Jesus to the bread and wine of the meal is one which refers them to His death as a sacrifice. As to the second point, the fact that Luke's mention of Jesus' purpose of a permanent observance of the Supper is practically derived from Paul confines the authority for this item in the narrative wholly to the Apostle. In regard to the worth of his testimony, it is evident, on the one hand, that the earliness of his account, in comparison with the Gospel records, gives it a relative value beyond theirs. This is confirmed by the almost necessary assumption that, even if the peculiar way in which he introduces his account (verse 23 a) was not intended by him to refer his knowledge of the facts to divine revelation, it was intended to place it on a high plane of authority. On the other hand, the fact that Paul is writing to the disorderly church at Corinth, and has in mind at this particular point in his Epistle their shameful conduct of the Lord's Supper, might lead Paul to read this purpose into the narrative of the event by way of emphasizing to his readers the continual authority of the Supper. It would be manifestly unwarranted, however, to hold that such action on Paul's part disposed of the question, since the portrayal of the Supper by Mark and Matthew as, in the mind of Jesus, a covenant between Himself and His disciples, implies an intended permanence in the observance of the event, which practically involves the command, "This do in remembrance of Me," whether it was actually uttered or not. It would seem, therefore, that whatever difficulties lie in the way of a complete solution of the problem, the following essential facts are clear: that Christ, in a final supper with His disciples, symbolically referred the bread and wine of the meal to His approaching death as a sacrificial act on His part, in their partaking of which symbols they entered into a covenant realization of its benefits and recognition of its obligations.

(*c*) *The Resurrection.*—While none of the Gospels record the act itself, they all record the fact of the Resurrection, though in narratives which differ widely from one another. (The concluding verses of the last chapter of Mark, xvi. 9–20, are recognized as a later substitute for the ending of the Gospel, and John xxi as a probable supplement to the original Gospel.) The most significant divergence is regarding the scene of the chief appearances of Jesus—Matthew (xxviii. 16–20) and, by implication, Mark (xvi. 7) placing it in Galilee, Luke (xxiv) and John (xx) in Jerusalem. The minor divergences relate to individualities in the narration of events, involved in which are some notable peculiarities, such as Matthew's reference to the accompanying natural and angelic events (xxviii. 2–4), and the gathering of the eleven at a mountain in Galilee (verses 16–20); Luke's story of the two disciples on the way to Emmaus (xxiv. 13–15), and his account of Jesus' final blessing of the disciple band and His ascension from them at Bethany (verses 50–53); John's record of the curing of Thomas's doubt (xx. 24–29). Further involved in these individualities of narration are some striking difficulties of detail, such as the statement by Luke (xxiv. 9) that the women told their experience at the sepulchre to the eleven and to all the rest, while Mark says that they said nothing to any man (xvi. 8); John's statement that Jesus forbade Mary to touch Him (xx. 17), while Matthew recounts that the women, including Mary, were allowed to clasp His feet (xxviii. 9). Apart from these divergences, however, there manifest themselves the following whole and partial agreements: (1) As to the visit of the women to the sepulchre. All the Synoptists unite in saying that they made their visit early in the morning, finding the tomb empty and returning to the city with the fact impressed upon their minds (Mark xvi. 2–4, 6; Matt. xxviii. 2, 3, 5, 6; Luke xxiv. 4–6 a). John confines his account to the experience of Mary Magdalene, but states also on her part an early-morning visit, implying the finding of an empty tomb, and the announcement of the fact to Peter and John, who themselves go to the sepulchre and confirm the story by their personal observation and then return to their homes (xx. 1–10; cf. Luke xxiv. 12). (2) As to the angelic appearances. All the Synoptists unite in relating a vision of angels at the tomb (Mark and Matthew one angel, Luke two), and a message from the angels, through the women, to the disciples, to the effect that Jesus was risen (Mark xvi. 5, 6; Matt. xxviii. 2, 3, 5, 6; Luke xxiv. 4–6 a), Mark and Matthew adding an announcement that Jesus would meet with His disciples in Galilee (Mark xvi. 7; Matt. xxviii. 7); Luke, merely a reminder of what Jesus had said to His disciples concerning His death and resurrection while He had been with them in Galilee (xxiv. 6–8). (3) As to the appearances of Jesus Himself. (*a*) Matthew and John unite in relating an appearance to the women after leaving the tomb (Matthew to the group, John to Mary Magdalene). On this occasion a message is given them by Jesus Himself to His disciples (Matthew, that He would precede them into Galilee; John, that He would ascend into heaven) (Matt. xxviii. 10; John xx. 17). (*b*) Luke and John unite in relating an appearance to certain of His disciples during the evening of this same day, in which Jesus convinced their unbelief by displaying to them the marks of His crucifixion; Luke adding the items of the disciples' fear at the appearance and the material proof given by Jesus of His bodily existence, together with His instruction of them in the Scriptures' reference to Himself and His work; John, the items of the appearance being accomplished in spite of closed doors, Jesus' impartation to them of the Holy Spirit, and His recognition of them as His representatives in the world (Luke xxiv. 36–49; John xx. 18–23). In our study of the Gospel narratives, however, account must be taken of the definite statement made by Paul in his First Epistle to the Corinthians (xv. 4–8), where he gives a list of six appearances of Jesus—first to Peter, then to the twelve, then to a company of more than 500 disciples, after that to James, then to all the Apostles, adding finally the appearance to himself. This statement, like that regarding the Lord's Supper, has priority over the earliest Gospel account and is placed by the Apostle on a high plane of reliability of source. In view of these facts it is significant that its only divergence from the Gospel accounts is by way of supplementation to what they narrate. From all this, then, it would seem quite possible for Jesus to have appeared to certain individuals among His disciples in Jerusalem and its neighborhood within eight days after His resurrection; later to have appeared to larger numbers of His followers in Galilee; and finally, before His ascension, to have appeared to the apostolic circle in Jerusalem, leading them out to Bethany, where He was parted from them. The only question would be the time taken for the disciples' journey from Jerusalem to Galilee and return, and this is not a serious one. As to the general sequence of events, however, it is quite impossible to construct any narrative which will include all the items of the independent accounts as given us in the four Gospels. It is most likely that the four statements (Matt. xxviii. 1; John xx. 1; Luke xxiv. 4, 10) regarding the visits by the women are merely variants of fragmentary accounts of a single visit early in the morning, for the purpose of completing the burial.

It is quite natural that, when Peter and John were informed as to what had taken place, they should have proceeded at once to the sepulchre in order to verify the facts and, upon arriving at the place, that it should be John who rose to a believing idea as to what might be behind the facts (John xx. 3–10; cf. Luke xxiv. 12). Mary Magdalene may have returned to the sepulchre at the same time as Peter and John, and while there the Master may have appeared to her (John xx. 14–18; cf. Mark xvi. 9)—the vision of angels given in John xx. 11–13 being a confusion of the Synoptic account.

The appearances to the disciples recorded in Luke xxiv. 13 ff., cf. Mark xvi. 12; Luke xxiv. 34, cf. 1 Cor. xv. 5; Luke xxiv. 36 ff.; John xx. 19 ff., cf. Mark xvi. 14, most likely followed in the Jerusalem region; while the appearances in Galilee (as recorded in John xxi. 1–23; Matt. xxviii. 16 f., cf. 1 Cor. xv. 6 f.) were probably later.

The appearance to the 500 (1 Cor. xv. 6) was in all likelihood the same as that recorded by Matthew (xxviii. 16 f.), following the meeting at the lake referred to by John (xxi. 1–23). The appearance to James (1 Cor. xv. 7) may naturally have been the last before the ascension, which latter event is referred to by Paul as the appearance to "all the apostles," at which time the commission was most fittingly given—Matthew inaccurately connecting it with the appearance to the disciples in Galilee (xxviii. 18–20), and Luke compressing it into connection with the appearance to the eleven in Jerusalem in his desire to prepare the closing of the Gospel narrative for the beginning of that of his Second Book.

As a general result, the problem presents itself, not as one of mutually exclusive records, since, admitting all the minor contradictions, the agreement among the narratives as to the essential facts is clear. The problem reduces itself in reality to the question whether the source of these narratives is more likely to have been the actual fact of the resurrection, evidenced to the disciples, or a self-persuasion of it on their part, through a desire to believe it to have occurred, though it had not. The decision between these alternatives will be determined by the inference which must inevitably be drawn from the facts (1) that the disciples did not reach their belief by any slow process of reasoning, but by an almost immediate conviction of the event, in spite of their deep despondency over Calvary; and (2) that it has been on the proclamation of this event, as the basal ground of its faith in Jesus, that Christianity has reached its stupendous results in the world.

B. The Problem of the Chronology. This concerns itself chiefly with the question as to the length of Jesus' ministry; and this question turns largely upon the character of the feast mentioned in John v. 1. If this is held to be a Passover, the duration of His active work is extended to at least three years; if it is not so held, the limit is reduced to perhaps two years. For full discussion of this and minor points, see NEW TESTAMENT CHRONOLOGY. See also the articles on the individual Gospels.

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GOSPEL. In the liturgical sense, the short selection from the Gospels which is read or sung in the mass and in the Anglican communion service between the epistle and the creed. It formed a regular part of the service as early as the second century. For 200 years the reading was continuous, taken up each day where the previous one had stopped; but when the calendar was fully developed under Pope Damasus the selections were chosen to correspond with it. The liturgical gospels were not originally included in the same book with the rest of the service, which allowed special ceremonial veneration to be paid to the book containing them. Thus, in the fifth century it was brought in solemn procession and laid upon the altar at the beginning of the service; a relic of this practice is the present custom of having the deacon deposit it for a while upon the altar immediately before singing the gospel. The bearing of lights in connection with it was known to St. Jerome and signifies the illumination of the world by the gospel message. The reading is prefaced by the response *Gloria tibi, Domine* (Glory be to thee, O Lord!), and followed by *Laus tibi, Christe* (Praise be to thee, O Christ!), after which the book is kissed by the celebrant. All present have always stood during the reading with uncovered heads, even kings laying aside their crowns. The recitation of the "last gospel" (commonly the first 14 verses of John, unless commemoration is made of a superseded office by the use of its gospel) is of later introduction. In the thirteenth century the priest recited it on the way to the sacristy, as the bishop does to-day on the way from the altar to his throne. Pius V in his revised missal gave it its present place. See Mass; Epistle.

GOS'PELER. A name applied to the minister in the Church of England who reads the gospel in the communion service, analogous to the deacon in the mass. (See Epistoler.) It was also used as a nickname for Wiclif and his followers when they devoted themselves to the circulation of the Scriptures in the vernacular.

GOS'PORT. A fortified seaport and market town in Hampshire, England, 81 miles southwest of London, on Portsmouth harbor (the English Channel), directly opposite Portsmouth, with which it is connected by a floating bridge (Map: England, E 6). It is the chief manufacturing seat and depot of stores for the equipment of the British navy. The inhabitants are mostly engaged in government establishments, which comprise powder magazines, fusee and rocket laboratories, and the Royal Clarence Victualing Yard, with its various important departments. Among the industries are the manufacturing of anchors and chain cables, yacht building, and sailmaking. The town is inclosed within ramparts with an outer circle of forts, which merge in the continuous barrier that surrounds Portsea and Portsmouth. On the southeast is Haslar Hospital, the celebrated national institution for disabled sailors, accommodating 2000 patients. Bishop Henry de Blois is said to have bestowed the name of God's port —hence Gosport—when he found safety here during a storm in 1158. The large suburban district of Alverstoke is included in the census of Gosport. Pop., 1901, 28,900; 1911, 33,300.

GOSS, Charles Frederic (1852–). An American Presbyterian clergyman and writer, born at Meridian, N. Y. He graduated from Hamilton College in 1873 and from Auburn Theological Seminary in 1876. Ordained in 1876, he held various pastorates until 1885, when he was called to the Moody Church in Chicago. In 1892–94 he was assistant pastor of the Madison Avenue Church, New York, and after 1894 pastor of the Avondale Presbyterian Church, Cincinnati, Ohio. He is author of *The Optimist* (1897; 4th ed., rev., 1905); *The Philopolist* (1898); *Hits and Misses* (1899); *The Redemption of David Corson* (1900), his best-known book; *The Loom of Life* (1902); *Little Saint Sunshine* (1902); *Just a Minute* (1904); *Husband, Wife, and Home* (1905); *That Other Hand upon the Helm* (1910); *Cincinnati, the Queen City, 1788–1912* (4 vols., 1912).

GOSS, William Freeman Myrick (1859–). An American mechanical engineer, born at Barnstable, Mass. He studied at Massachusetts Institute of Technology in 1877–79; organized the department of practical mechanics at Purdue University, where he was dean of the School of Engineering and director of the engineering laboratory from 1890 to 1907; and thereafter was dean of the College of Engineering at the University of Illinois. In 1913 he was engineer for the committee of investigation of the smoke nuisance in Chicago. He also served as president of the American Society of Mechanical Engineers in 1913. Besides various papers and reports on locomotive service, he is author of *Bench Work in Wood* (1887; rev. ed., 1905); *Locomotive Sparks* (1902); *Locomotive Performance* (1907); *Superheated Steam in Locomotive Service* (1910); *Tests of a Jacobs-Shupert Boiler* (1912).

GOSSART, gŏs'särt, Jan. See Mabuse, Jan.

GOS'SAMER (ME. *gossomer*, *gosesomer*, goose summer, from *gos*, goose + *somer*, summer; so called on account of the downy appearance and the time of coming). A light filamentous substance, which often fills the atmosphere to a remarkable degree during fine weather in autumn, or is spread over the ground, stretching from leaf to leaf and from plant to plant, loaded with dewdrops, which glisten and sparkle in the sunshine. It is produced by small spiders of many species and is said to be produced by young and not by mature spiders—a circumstance which, if placed beyond doubt, would help to account for its appearance at a particular season of the year. The threads of gossamer are so delicate that a single one cannot be seen unless the sun shines on it; but being driven about by the wind, they are often beaten together into thicker threads and flakes. They are often to be felt on the face when they are scarcely visible. The spiders which produce these threads shoot them out from their spinnerets—a viscid fluid being ejected with great force, which becomes a thread; sometimes several such threads are produced at once in a radiating form, and these, being caught by the ascending current of heated air, are borne up, and the spider along with them. See Spider.

GOSSE, gŏs, Edmund William (1849–). An English poet, critic, and biographer. He was born in London, the son of Philip Henry Gosse. Though he did not have a university education, he received, in recognition of his services to letters, the degree M.A. (1885) from Cambridge and the degree LL.D. (1899) from St. Andrews. In 1867 he was appointed assistant librarian in the British Museum; in 1875, translator to the Board of Trade; in 1884, Clark lecturer in English literature at Trinity College, Cambridge; and in 1904, Librarian to the House of Lords. In 1884 he visited the United States, lecturing at Harvard, Yale, Johns Hopkins, and other colleges. His chief works are: *Madrigals, Songs, and Sonnets* (1870); *On Viol and Flute* (1873); *Northern Studies* (1879); *Thomas Gray* (1882); *Seventeenth Century Studies* (1883); *Congreve* (1888); *History of Eighteenth Century Literature* (1889); *The Secret of Narcisse* (1892); *In Russet and Silver* (1894); *The Jacobean Poets* (1894); *Critical Kit-Kats* (1896); *Short History of English Literature* (1897); *Life and Letters of Dr. John Donne* (1899); *An Illustrated History of English Literature*, with Garnett (1902); *Jeremy Taylor* (1904); *French Profiles* (1905);

Coventry Patmore (1905); *Sir Thomas Browne* (1905); *Father and Son* (1907), crowned by the French Academy in 1913, an autobiographic work; *Henrik Ibsen* (1908); *Portraits and Sketches* (1912); *Two Visits to Denmark, 1872, 1874* (1912); *Collected Essays* (5 vols., 1913).

GOSSE, Nicolas Louis François (1787–1878). A French historical painter, born in Paris, where he studied at the Ecole des Beaux-Arts and under Vincent and became a skilled representative of the classic academic style. His principal works include: "Napoleon I and Queen Louise at Tilsit," "Meeting of Napoleon and Alexander of Russia at Erfurt," and "Louis Philippe Declining the Crown of Belgium Offered to his Son," all in the Historical Museum at Versailles; and "Entry of the Duke of Angoulême into Madrid," a wall painting in the Hôtel de Ville, Paris.

GOSSE, Philip Henry (1810–88). An English naturalist, born at Worcester, England. From 1827 to 1835 he lived in Newfoundland as a merchant, from 1835 to 1838 in Canada as a farmer, and from 1838 to 1839 in Alabama as a teacher. In 1844 he visited Jamaica to study the birds there. He was an accurate observer of animal life and a voluminous and most agreeable writer. In 1856 he was made F.R.S. Gosse did a great work in advancing and popularizing marine zoölogy, and the influence he exerted was widespread and lasting. Among his publications are: *The Canadian Naturalist* (1840); *Birds of Jamaica* (1851); *Natural History* (1848–51); *A Naturalist's Rambles on the Devonshire Coast* (1853); *The Aquarium* (1854); *Marine Zoölogy* (1856); *Evenings with the Microscope* (1859); *Letters from Alabama* (1859); *Land and Sea* (1865); *Life in its Lower Forms* (1875); *A Year at the Shore* (1877).

GOSSEC, gȯ̆'sĕk', François-Joseph (1734–1829). A French composer, born at Vergnies in Hainaut. He was a choir boy in the Antwerp Cathedral and then went to Paris, where, through the influence of Rameau, he was employed by a rich amateur, La Popelinière, to direct his private orchestra. Gossec has been called "the father of the symphony in France." He found all instrumental music neglected and made it his ambition to revivify it. His first symphonies were published in 1754, five years before Haydn wrote his. While orchestra conductor to the Prince of Conti, he wrote several operas. To him belongs the honor of having started the Ecole Royale de Chant (1784), which was the prototype of the Conservatory, and when that institution itself was founded (1795), he was one of the three inspectors, the others being Méhul and Cherubini. During the Revolution he was the conductor of the band of the Garde Nationale and composed a good deal of national music for fêtes. A critic sums up Gossec as "not one of those geniuses who defy time," and he had the misfortune to see his ideas improved upon by some of his contemporaries; but his influence on the development of instrumental music in France can hardly be overestimated. His works include: *Le faux lord* (1764); *Les pêcheurs* (1766); *Alexis et Daphné* (1775); *Philémon et Baucis* (1775); *La fête du village* (1778); *Thésée* (1782); *Rosine* (1786); *Chant du 14 Juillet, Hymne à l'humanité; Hymne à l'Etre suprême; Chœurs et chants pour l'apothéose de Voltaire et de Rousseau;* some oratorios and a good deal of instrumental music. Consult F. Hellouin, *Gossec et la musique française à la fin du dixhuitième siècle* (Paris, 1903).

GOSSELIN, gȯ̆s'lăN', Auguste Honoré (1843–). A Canadian historian and biographer. Born at St. Charles de Bellechasse, Province of Quebec, educated at the Quebec Seminary and Laval University, and ordained a Roman Catholic priest in 1866, he was secretary to the Archbishop of Quebec for two years, vicar at the Quebec Basilica in 1868–69, pastor of Ste. Jeanne de Neuville, Pont Rouge, in 1869–86, and pastor of St. Féréol until 1893, when he turned to literary work. In 1892 he was elected a fellow of the Royal Society of Canada and later a corresponding member of the Society of Antiquities of Normandy. In 1907 he was appointed a member of the Canadian Historical Manuscript Commission. He published: *La vie de Mgr. Laval, premier évèque de Quebec et apôtre du Canada* (2 vols., 1890); *Les Normands au Canada* (3 vols., 1892–94); *Observations à propos du P. le Jeune et de M. de Queylus* (1896); *La vie de Henri de Bernières* (1897); *Un bon patriot d'autrefois, le Dr. Labrie* (1898); *Mgr. de Saint Valier et son temps* (1900); *Jean Nicolet et le Canada de son temps* (1905); *L'Abbé Holmes et l'instruction publique* (1908); *Le vrai monument de Champlain* (1909); *Au pays de Mgr. de Laval* (1910); *L'Eglise du Canada depuis monseigneur de Laval jusqu'à la conquête* (1911).

GOSSELIN, Pascal François Joseph (1751–1830). A French archæologist, born at Lille, France. After acting as a deputy to the National Assembly (1789), he became a member of the central administration of commerce (1791), and was employed in making maps for the War Department (1794). He was employed by Napoleon to assist in the translation of Strabo, was one of the chief editors of the *Journal des Savants* after 1816, and published, among other works, *Géographie des Grecs analysée* (1790) and *Recherches sur la géographie systématique et positive des anciens* (1798–1813).

GOSSLER, gōs'lẽr, Gustav von (1838–1902). A Prussian statesman, born at Naumburg. He studied law at Berlin, Heidelberg, and Königsberg, and, after having held a number of government posts, was an assistant in the Ministry of the Interior from 1874 to 1878, and in 1879 was appointed Undersecretary of State in the Ministry of Ecclesiastical Affairs and Public Instruction. In 1881 he succeeded Puttkamer in the ministry. The troubles attending the Kulturkampf were still active, but he ended them by a practical scheme of informal concession to the Roman church. Thus, he did away with several provisions of the so-called "May Laws," such, e.g., as the examination of the clergy and appointment of priests by the state. Other measures of conciliation were also devised by him, sometimes not without the opposition of the Prussian government. He very vigorously opposed the Polish nationalistic movement in Posen, and in 1887 struck a decisive blow by abolishing instruction in the Polish language in the public schools, and thus did much to bring about the acute Polish situation which exists to-day. In 1890 he formulated a school law which gave offense to the Poles, and of whose immediate passage there was little hope, since the government at that time required Polish assistance in the Reichstag in support of its commercial projects. He therefore resigned in 1891 and soon afterward was appointed Lord Lieutenant of West Prussia. Consult his *Ansprachen und Reden* (Berlin, 1890).

GOSSNER, gȯs′nẽr, Johannes Evangelista (1773–1858). Founder of the Gossner Foreign Missionary Society. He was born at Hausen, near Augsburg, Dec. 14, 1773, educated at Dillingen and Ingolstadt, and from 1796 to 1826 served in the ministry of the Roman Catholic church. During 1820–24 he was preacher in St. Petersburg. As early as 1802 he was suspected of leanings towards Protestantism, and in 1826 he openly joined the Evangelical church. From 1829 till 1846 he preached in Berlin and labored zealously for missions, education, and philanthropic undertakings. He became a director of the Berlin Missionary Society when it was founded in 1831, but left it in 1836 because he wished missionaries to have greater liberty of action. Assisted by voluntary contribution, he continued to send forth missionaries, and in 1842 his missionary society was formally organized. It still exists, and labors chiefly in the East Indies. Gossner died March 30, 1858. Among other works he published: *Geist des Lebens und der Lehre Jesu* (1823); *Die Heiligen Schriften des Neuen Testaments mit Erklärungen und Betrachtungen* (new ed., 1888–94); *Goldkörner* (6th ed., Berlin, 1893). Consult his life by Dalton (Berlin, 1878).

GOS′SON, Stephen (1554–1624). An English author, born in Kent. Entering Corpus Christi College, Oxford, he was graduated B.A. in 1576 and wrote several plays, of which none are extant. Later he attacked the stage violen′ly and took orders. In his *Schoole of Abuse* (1579; reprinted by E. A. Arber, 1868) he began a lively controversy about the stage, which led to many pamphlets and ultimately to Sidney's *Apologie for Poetrie* (1595).

GOSSYP′IUM. See Cotton.

GOSZCZYŃSKI, gŏsh-chụn′skė. Seweryn (1803–76). A Polish poet, born in the Government of Kiev, Russia. He was educated at Warsaw and was one of the foremost leaders of the revolution of 1830. He was one of the band of fugitives who subsequently assembled in Paris, and they exercised a very powerful influence upon him. In 1872 he returned to Lemberg, where he died. His works are lyrical in character, and many of them are devoted to a description of life in the Carpathians and in the Ukraine. Most of them are characterized by a vein of sadness due probably to the political conditions which have weighed so heavily upon the patriotic poets and authors of Poland. During the latter part of his life he fell under the influence of the mystic Towianski (q.v.). His principal poetic productions include: *Zamek Kaniowski* (The Kaniow Castle, a gruesome epic betraying Byron's influence; trans. into German and French); *Król Zamczyska* (The King of the Ruined Castle, 1842); *Oda; Powieść z czasów Boleslawa Chrobrego* (1852); *Poslanie do Polski* (Message to the Poles, 1869). He also prepared an excellent translation of Ossian. The latest edition of his *Works* is that of Lemberg (2 vols., 1904).

GOT, gō, François Edmond (1822–1901). An actor of the Comédie Française, where he made his appearance in 1844. He was born at Lignerolles (Orne) and educated at the Lycée Charlemagne. After a short time spent as a government clerk he entered the Conservatoire in 1841, where in the two following years he carried off successively the second and first prizes. He made his début at the Comédie Française in 1844 as Alexis in *Les heritiers* and Mascarille in *Les précieuses ridicules*. He speedily rose to the highest rank as a comic actor, and was elected a member of the company six years later. His subsequent career was spent chiefly at the "House of Molière," but in 1866 by special arrangement he played in Emile Augier's *Contagion* at the Odéon and afterward "starred" in this piece in various provincial cities. One of his most popular creations was Giboyer in *Les effrontés* and *Le fils de Giboyer*, a part to which he devoted himself for two years. M. Got was the author of the libretto of *François Villon*, which was rendered at the Opéra in 1857, and of *L'Esclave* (1874). His golden jubilee at the Théâtre Français was celebrated in 1894, and he made his farewell appearance in 1895. He died in Passy.

GÖTA-ELF, yû′tȧ-ĕlv′ (*elf*, Dano-Norwegian *elv*, river). The outlet of Lake Venern (q.v.) in Sweden, forming, with its upper course, the Klar-Elf, the largest river system of the Scandinavian peninsula. The Klar-Elf rises among the Kjölen Mountains a short distance from the Norwegian boundary, and on the boundary between Svearike and Norrland, and flows southeast as a violent mountain torrent, first through a part of Norway, where it widens into the Fämund-Elv, and then through the Swedish Län of Vermland, where it empties into Lake Venern at Karlstad. Leaving Lake Venern at its southwest corner, the Göta-Elf proper flows in a nearly southerly direction and empties by two arms into the Cattegat at the city of Göteborg, situated on the south arm. The length of the Göta-Elf is 68 miles, but the whole length of the river, including the Klar-Elf, is 440 miles. The river forms a number of falls or rapids, of which the famous Trollhättan (Witch's Cap) in the Göta-Elf proper, a few miles below Venern, is the largest and is one of the most picturesque rapids in the world. Navigation has been made possible past the Trollhättan by means of a canal, which through Lake Venern connects with the Göta Canal, constructed in 1810–32 at a cost of over 14,000,000 kroner (about $4,000,000) and which opens up a continuous waterway by way of Lake Vettern from the Cattegat to the Baltic Sea through the heart of Sweden.

GOTAMA, gō′tȧ-mȧ. An early Hindu philosopher and logician. He is the reputed author of the *Nyāya-Sūtras*, or aphorisms of logic, which form the basis of the Nyaya system of philosophy (q.v.). As an appellative, Gotama is a very old name in India; one of the Vedic seers was called Gotama and bore the patronymic Rahugana. From Gotama descended the family of the Gautamas. Buddha also was known as Gautama Buddha (q.v.), or in the Pali form as Gotama Buddha.

GÖTARIKE, yẽ′tȧ-rē′k*e*, or **GOTHLAND** (Swed., Kingdom of the Goths) (Map: Sweden, E 8). One of the three historical divisions of Sweden, occupying the southern part of the country and divided into 12 läns.

GOTCH, Francis (1853–1913). An English physiologist, born in Liverpool and educated at Cambridge. He was appointed demonstrator in physiology at Oxford University in 1883, accepted the chair of physiology at Liverpool in

1891, and returned in 1895 to Oxford, where he held the Waynflete professorship until his death. His researches concerned particularly the excitable tissues of the muscles and nerves. He was elected a fellow of the Royal Society in 1892. He published *Two Oxford Physiologists: Richard Lower, 1631 to 1691, John Mayow, 1643 to 1679* (1908).

GÖTEBORG, yẽ′te-bôr′y′, **GOTH′ENBURG**, or **GOT′TENBURG.** Capital of the Län of Göteborg and Bohus, and, next to Stockholm, the most important city of Sweden, situated on the river Göta, 4 miles from its mouth (Map: Sweden, D 8). The town is semicircular in form and lies in a plain surrounded by hills. The newer sections are built on the hills; the lower portion along the river has broad streets, partly formed by canals and lined with trees. In the centre of the town are the Gustav Adolfs Torg, or market place (containing statues of Gustavus Adolphus, Oscar I, and Odin), the exchange, and the town hall. Other noteworthy buildings are the cathedral, the Governor's palace, and the arsenal. The educational institutions comprise a university supported from private funds, with 2051 students, mostly auditors, in 1913; a Gymnasium; technical, commercial, and nautical schools; a municipal library of 125,000 volumes; a museum with fine archæological, zoölogical, and industrial collections; and a scientific society, founded in 1778. The water supply is good; the streets are lighted by gas and electricity. Street railways and omnibuses traverse the town.

Cotton spinning, saw milling, shipbuilding, iron and steel milling, are among the manufacturing industries. Other important products are sugar, porter, paper, sailcloth, and leather; the town stands preëminent in Sweden on account of its commerce. Its harbor which has 3 miles of quays approachable by vessels of 20-foot draft, is rarely blocked by ice and affords a shelter for a large number of vessels from all parts of the world. The largest exports are pig and wrought iron, steel, zinc, manganese, lumber, matches, oats, fish, and pork. Among the imports are sugar, coffee, grain, cotton and cotton goods, and coal. Göteborg receives about one-fourth of the total foreign commerce of Sweden. The United States is represented by a consul. Pop., 1840, 26,084; 1900, 130,619; 1912, 173,875. Göteborg was founded on its present site in 1619 by Gustavus Adolphus and is world-famous for its plan of municipal licensing known as the Gothenburg System (q.v.).

GOTHA, gō̇′tȧ. The capital of the Duchy of Gotha and, alternately with Coburg, the residence of the dukes of Saxe-Coburg-Gotha. It is situated on the Leina Canal, 17 miles by rail southwest of Erfurt (Map: Germany, D 3). Gotha is a well-built, pleasant city, near the north edge of the Thuringian Forest. It is composed of the old inner town and four modern suburbs separated from it by promenades. The finest building is the ducal palace of Friedenstein, situated on an eminence south of the old town. It is an extensive building, with two massive towers, erected in 1643 by Ernest the Pious, and occupies the site of the old fortress of Grimmenstein. It is surrounded by promenades and a park and contains a library of about 200,000 volumes, 1900 incunabula, as well as 7000 manuscripts, including many in Arabic, and one of the best collections of coins in Germany. The public park is worthy of note. The well-known museum was constructed in an ornate Renaissance style in 1864–77. It contains an extensive collection of ancient pottery, gold, ornaments, weapons, embroideries; an ethnographical collection; a splendid gallery of paintings, rich in old masters; a collection of sculptures, engravings, and casts; a natural-history cabinet; and a variety of miscellaneous treasures. Other noteworthy buildings are the fine sixteenth-century Renaissance Rathaus, the Augustinian Church with a large altarpiece, the theatre, and the Friedrichsthal Palace (now occupied by the government offices), the Masonic lodge, and the post office. The town is lighted by electricity and has an electric street railway. Educational and benevolent institutions are numerous, including art and medical schools. There are also many active unions and associations, scientific, historical, etc. It is noted for the number and activity of its insurance societies. The city is an important centre in the publishing and art trade of Germany. The famous *Almanach de Gotha* and *Petermann's Mitteilungen* are published here, being issued by the firm of Justus Perthes, the foremost geographical establishment in Germany. Industrially and commercially Gotha is one of the most important cities of Thuringia. The chief products are porcelain ware, meat, footwear, tobacco, machinery, soap, sugar, woolens, stoves, and brick. There are also large railway repair shops and numerous engraving and printing establishments. Pop., 1890, 28,134; 1900, 34,651; 1910, 39,553, composed almost exclusively of Protestants.

Gotha probably was a village at the time of Charlemagne. It is first mentioned as a town at the beginning of the twelfth century, when it belonged to the landgraves of Thuringia. In 1440 it passed to the electors of Saxony. In the partition of the Saxon dominions in 1485 it became part of the possessions of the Ernestine line, and since 1640 has been the capital of the Duchy of Gotha. See Saxe-Coburg-Gotha.

GOTHA, Almanach de. A universal political register, printed in German from 1764 to 1804, in French from 1805 to 1871, and since in both languages. See Almanac.

GOTHA, Duchy of. See Saxe-Coburg-Gotha.

GOTHAM, gŏt′*a*m *or* gŏth′*a*m *or* gō′th*a*m. A parish in Nottinghamshire, England, the name of which is suggestive of simple or foolish people. Tradition states that King John proposed making a progress through the town with the intention of purchasing a castle, but the people (the traditional "Wise Men of Gotham"), averse to the expense of maintaining royalty, turned him away by engaging in idiotic pursuits. Gotham, however, is only one of the many European localities to which a similar tradition is applied. Irving in his *Salmagundi* applied the name "Gothamite" to the inhabitants of New York. Consult Cunningham, *Amusing Prose Chap-Book* (Glasgow, 1888).

GOTHAM ELECTION, A. A farce by Mrs. Centlivre, published in 1715, but never acted.

GOTHAMITE, gō′th*a*m-īt *or* gŏth′*a*m-īt. A New Yorker: a designation first applied by Washington Irving in *Salmagundi* in 1807.

GOTHENBURG, gō′t*e*n-bụrk. See Göteborg.

GOTHENBURG SYSTEM. The system of regulating the liquor traffic at Gothenburg, or Göteborg, in Sweden, put in operation in 1865. In 1864 a committee on pauperism proposed as a remedy that the sale of the national drink (brandy) should, under the Law of 1855, be bonded over to a company to carry on the trade for the benefit of the working classes. The general features of the system are as follows: The company is granted a monopoly for which it pays a tax; the shareholders, who are usually prominent citizens, cannot receive a dividend beyond 6 per cent (5 per cent in Norway); the additional profits of the company are shared between the town, the agricultural society of the province, and the general government (in Norway by educational and charitable institutions); the well-kept bars are placed in the hands of managers who receive a salary, who maintain eating houses with cheap, well-cooked food, and who can sell coffee, mineral waters, and cigars for their own profit. The policy of the company has been that of strict control, a reduction of the number of drinking places, and the raising of the price of brandy. Some of the results, it has been claimed, are the diminishing of the temptation to drink, the divorce of liquor from politics, the sale of pure spirits, and better rules as to minors and hours. The system with variations has been widely adopted in Sweden and Norway and also in Finland. While the system has been the subject of numerous encomiums, from both native and foreign observers, there have not been wanting students who have pointed out abuses connected with it. Since profits from the bars are in many cases a significant form of public revenue, the municipal officers have had an inducement to encourage drinking. Further, other spirituous liquors, not controlled by the system, have gained in popularity; and sale in bulk, which is likewise free from control, has gained relatively to trade at the bar.

A modified form of the Gothenburg system was adopted by South Carolina in 1892 under the name of the dispensary system. The sale of all forms of intoxicating liquors was monopolized by the State. The system gave rise to much popular dissatisfaction; charges of corruption were freely made, and in 1907 the system was abandoned. Consult: *Report of Massachusetts Committee on Gothenburg System* (1893); Rowntree and Sherwell, *Gothenburg Experiments and Public-House Trusts* (London, 1901); Thompson, "The Gothenburg Method," in *Transactions of Wisconsin Academy of Science, Arts, and Letters,* vol. xiii (Madison, 1901); Pratt, *Licensing and Temperance in Sweden, Norway, and Denmark* (London, 1907); Gordon, *The Breakdown of the Gothenburg System* (New York, 1911). See TEMPERANCE.

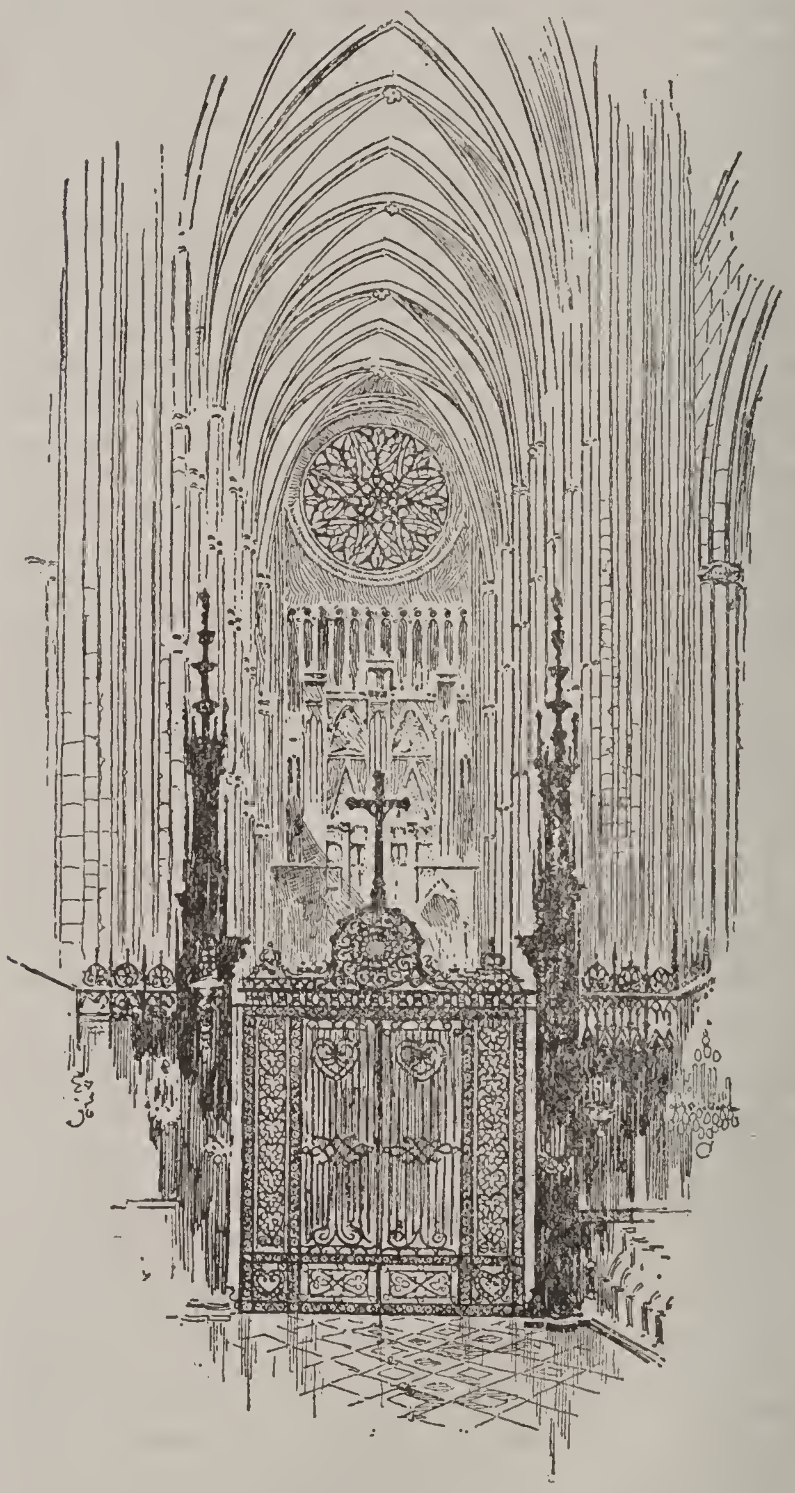
GOTH'IC ARCHITECTURE. Common usage has, ever since the Renaissance, employed this name to designate collectively and without discrimination the styles which were developed by the ecclesiastical builders of the Middle Ages in western Europe between 1150 and 1500, of which the most obvious common characteristics were the pointed arch, the traceried window, the flying buttress, spires and pinnacles, and internally the ribbed groined vault. The name "Gothic" is an obvious misnomer, for the Goths as a nation had disappeared long before the beginnings of this architecture, which was a logical outgrowth from the Romanesque of the twelfth century. (See ARCHITECTURE.) The Romanesque builders of France had evolved, especially in their monastic architecture, a type of cruciform church with three (rarely five) aisles, having stone-vaulted side aisles flanking a loftier central aisle lighted by a clearstory (q.v.), and usually vaulted in stone, though sometimes the ceiling was of wood.

During the first half of the twelfth century groined vaulting upon a framework of ribs had come into quite general use for the vaulting of all three aisles, allowing the clearstory windows to be carried much higher than was possible with a barrel vault, and furthermore concentrating the loads and thrusts of the heavy vaults at distinct isolated points instead of distributing them equally along the entire length of the structure. To resist these separate concentrated strains rudimentary forms of buttress (q.v.) and flying buttress had been devised.

These structural features the Gothic architects made the basis of a remarkable system of architecture in which structural requirements were met by practical devices frankly expressed in the design and made to contribute to the general decorative effect, with a constant progressive striving towards economy of material and loftiness and lightness of interior design. The decorative details were derived from nature, and sculpture, painting, and stained glass made to serve religious-didactic purposes, always subservient to the architectural ensemble. This development, which produced in time the most perfectly logical and structurally expressive of all architectural styles, was greatly stimulated by the rise of the episcopal power as against the monastic orders in France and was thus in an especial sense a cathedral-building movement, though by no means confined to cathedral buildings. The forms and principles it developed were applied to all sorts of buildings. The style spread from France to England, later to Germany and Spain and the Low Countries, and in greatly modified fashion to Italy. It made no impression on the Byzantine East. In the nineteenth century a persistent effort was made in England and to some extent in Germany and France to revive Gothic architecture modified to meet modern requirements (see VICTORIAN GOTHIC); it was only partially successful, though it has exerted some influence on modern design. Concurrently with the development of this remarkable ecclesiastical and civic architecture, the feudal lords and military chieftains of Europe were developing on quite different lines the military or feudal architecture (q.v.) of their castles, city walls, and fortresses. But though totally different in form from the Gothic church architecture, it displays the same logical directness of design, the same frankness of structural expression, whether in gate, tower, wall, or donjon. See FEUDAL ARCHITECTURE; CASTLE; DONJON.

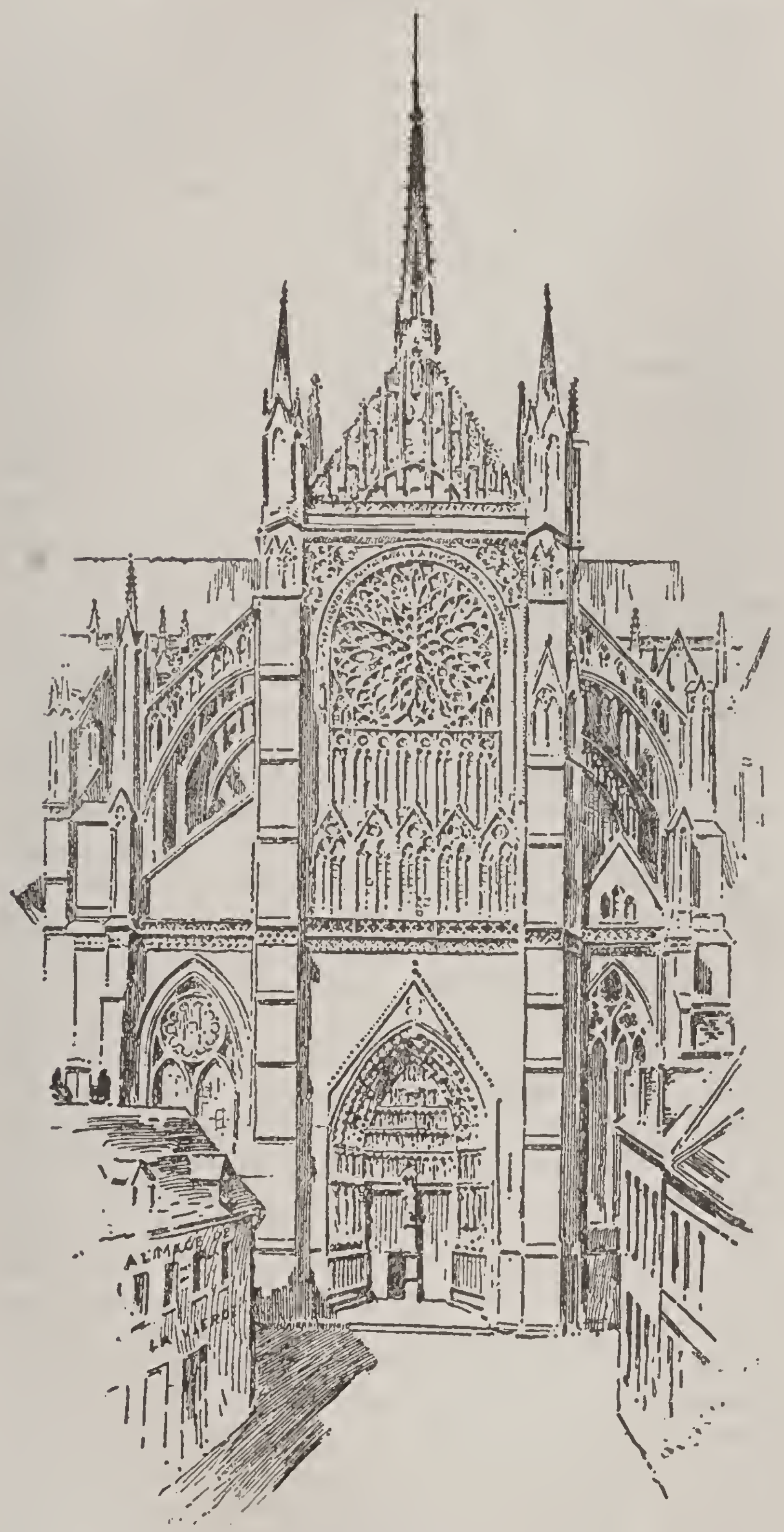
France. The transition from the heavy, round-arched Romanesque style, with its massive walls, small windows, and moderate height, to the Gothic style, with its light and lofty proportions, great traceried windows of stained glass, its pointed arches, slender clustered piers, ribbed groined vaults, flying buttresses, pinnacles, and wealth of floral carving and of sculpture, appears to have first begun, and can best be traced, in the region about Paris, the ancient "Ile-de-France," or Royal Domain, where the free communes were most numerous, and where the royal power seconded the rising of the bishops against the arrogance of the abbots and monastic orders. The germs of the transition are discoverable at Morienval, Saint-Germer-de-Fly, Saint-Etienne at Beauvais, and other churches erected previous to 1140. The pointed arch, employed both because it exerts less thrust than the round and because it can be made to reach any desired height with a given span, began to be applied to the vault ribs (see VAULTING) in these churches, and perhaps earlier in the porch of Vézelay Abbey in Burgundy. The original construction of the abbey of Saint-Denis (1140) embodied systematically many of the Gothic features. The cathedrals of Senlis, Noyon, and Laon, begun somewhat later, showed further progress; but it was the great cathedral of Notre Dame (q.v.) at Paris, begun in 1163, that first displayed the results of these developments in their completeness. The cathedral of Chartres, begun in its present form about 1190; of Rheims, dating from 1208; of Amiens, the greatest of all French cathedrals, begun in 1220; of Rouen, Bourges, Troyes, Tours, Le Mans (choir), and Soissons, represent the style in its maturity, attained by the middle of the thirteenth century, when the effort after lightness and loftiness reached its culmination. While the vault of Notre Dame is but 108 feet high, that of Amiens is 142 feet high. At Beauvais, begun about 1247, this effort overreached itself; the vault, 156 feet high, collapsed in 1275, and though the choir and transepts were rebuilt, the nave was never added.

The style spread rapidly from the Royal Domain through Normandy, Champagne, Picardy, and Burgundy, but made little impression on Brittany and southern France until the latter part of the fourteenth century, by which time the cathedral-building movement had nearly ceased. This decline was partly due to war and political confusion, partly to the fact that by that date the strong and rich dioceses were already provided with cathedrals. The grandest of the later cathedrals is that of Albi, dating from about 1300; it is unique in the vast space of its one-aisled nave, measuring 65 feet in width and flanked by side chapels; it has no transepts. But while the building of cathedrals declined and then ceased, that of churches and chapels continued, in a new and increasingly ornate style of design, in which structural expression was subordinated to decorative elaboration. At Rouen the church of Saint-Ouen marks the early stages, that of Saint-Maclou the culmination, of this later phase of the Gothic style; while the long-unfinished façade of the cathedral displays it in its utmost extravagance of minute elaboration. This last development was most successful in minor works like choir screens, pulpits, and tombs. It is thus possible to trace in French Gothic work three well-marked stages. The first, or *Early French,* extending from 1160 to about 1220, is the period of development, marked by a certain severity and high purity of detail and great simplicity of tracery, as in Notre Dame at Paris. The second is that of culmination, commonly called the *Rayonnant* on account of its superb radiating or rose windows; it is characterized by elaborate geometric tracery and richer moldings and carving than the first period (Amiens; Sainte Chapelle at Paris; transept fronts of Notre Dame, Paris), and extends to about the middle of the fourteenth century. The last period, from 1350 or 1375 to 1525, is called the Flamboyant, from the flamelike patterns of its tracery; its principal characteristics have already been described. To those already mentioned should however be added the general omission of capitals on the piers, a certain wiredrawn thinness of moldings, and the carrying up of ogee dripstones over the exterior arches, terminating in exaggerated finials. Notable examples, besides those already mentioned, are the churches of Saint-Jacques at Dieppe, Saint-Wolfren at Abbeville, the front of Notre Dame de l'Epine at Châlons, the Saint-Esprit Chapel at Rue, the church at Louviers, and the exquisite north spire of Chartres Cathedral (1525).



AMIENS CATHEDRAL — INTERIOR.

The perfected type of Gothic architecture, best illustrated by the cathedral of Amiens, displays, in plan, an enlarged choir with aisle and radiating chapels, no crypt, a short transept, three or five aisles, and sometimes a continuous line of aisle chapels; in front elevation, a western façade with two flanking towers, three prominent portals richly adorned with carving and figure sculpture, and a wheel or rose window in the centre above them. In side elevation but little wall surface appears except a row of pinnacled buttresses, the space between them being occupied by windows filled with tracery and stained glass. The interior was divided into bays by strongly marked vertical lines of support from the piers upward, presenting as if in three stories the piers and arches opening into the side aisles, the triforium passage above them, and the great traceried clearstory windows reaching up to the groined vaulting overhead. In the rich decoration the characteristic feature is the abandonment of classic and, indeed, of all traditional design, and the direct recourse to natural fauna and flora for models, which were of the greatest variety and truth. No period has so beautifully reproduced foliage and flowers in stone. But though there was a dominant type, there were wide differences; e.g., the façade towers terminate in spires at Chartres Cathedral, while at Notre Dame, Laon, Amiens, and elsewhere, they have square terminations. Other differences, though not fundamental, mark special schools of Gothic in Burgundy (Notre Dame at Dijon, Cathedral Auxerre) and in Normandy (cathedrals of Coutances, Bayeux, Lisieux, and Séez), while the Ile-de-France, Picardy, and Champagne are practically one school. If a single building were selected to typify perfect Gothic, it would be Amiens Cathedral, for both internal and external effects. The exaggeration of delicacy and height next attempted at Beauvais Cathedral was both constructively and æsthetically a failure as already explained.


AMIENS CATHEDRAL.

There is, however, no perfect west façade of this best period, for the façade of Amiens was not completed until 1288; that of Rheims not till 1380; while many other west fronts belong to the Flamboyant period, e.g., Rouen, Tours, Troyes. With the later Flamboyant works Gothic architecture expired in France, overborne and supplanted by the tide of the Renaissance (q.v.).

Consult the various histories of architecture; also Moore, *Development and Character of Gothic Architecture* (New York, 1899); Viollet-le-Duc, *Dictionnaire raisonné de l'architecture française* (Paris, 1854–68); Lassus, *Notre Dame de Paris* (ib., n. d.); Ducloux and Doury, *La Sainte Chapelle de Paris* (ib., n. d.); Enlart, *Archéologie française*, vol. i (ib., 1902–04); Hasak, *Die gotische Baukunst: der Kirchenbau* in *Handbuch der Architektur* (Stuttgart, 1887–1904); Dehio and Bezold, *Kirchliche Baukunst des Abendlandes* (ib., 1887–1901); Corroyer, *L'Architecture gothique* (Paris, 1891); *Archives* of the *Commission des monuments historiques* (ib., 1855–72); Durand, *Monographie de l'église Nôtre-Dame Cathédrale d'Amiens* (Amiens, 1901–03); Gurlitt, *Die Baukunst Frankreichs* (Dresden, 1900).

Great Britain. As the Gothic style in France developed out of the Romanesque, so in England it developed out of the Anglo-Norman, but along strictly national lines, although the initial step in this development was taken by a French architect, William of Sens, summoned in 1174 to rebuild the choir of Canterbury Cathedral after the disastrous fire of that year. The ribbed groined vault had already (as is now believed) been used over the nave of Durham Cathedral, but at Canterbury we have a nearly complete Gothic system. Lincoln Cathedral choir and transepts, begun in 1190, display the system applied in a distinctly English fashion, and from that time on all trace of French influence disappears, except in Westminster Abbey (1245–1490), whose plan and proportions are French, though its details are absolutely English. The English Gothic churches of the first rank—abbeys and cathedrals—differ from the French in fundamental ways. In plan they are longer, narrower, with square instead of apsidal east ends (q.v.), with longer transept arms having sometimes one side aisle, sometimes two, sometimes none, and sometimes with secondary transepts near the west front. They are much lower than the French; the Wells vault is but 63 feet high, Salisbury's 85, and Westminster Abbey's, the highest of all, is less lofty than that of Notre Dame at Paris—it measures 103 feet in height.

The English churches are in internal architecture far richer decoratively than the French—the piers more richly clustered, with shafts of black Purbeck marble; the moldings finer and more complicated, and the vaulting built with multiple ribs, producing highly decorative effects. On the other hand, the exteriors were less ornate than the French not only in having fewer pinnacles and flying buttresses, but in their lack of tabernacles and figure sculpture and in the insignificance of their portals. There was no fixed type of west front; York, Lincoln, Wells, Canterbury, Westminster, and Beverley have twin square western towers; Lichfield and Chichester, twin spires; Peterborough, Salisbury, Winchester, Exeter, and others have no western towers. Some of the fronts are mere screens; others, more logically designed, are uninteresting (Winchester). The finest external feature is the central crossing tower, replacing the French lantern, or *flèche;* these towers, mostly built after

1350, were usually square (Lincoln, Gloucester, Canterbury, York, etc.), but capped with a spire at Chichester, Lichfield, and Salisbury—the last named, 424 feet high, one of the most beautiful of all Gothic spires. English window tracery was developed more systematically and is on the whole more interesting than the French; the great east and west windows of the cathedrals are especially notable. (See TRACERY.)

English Gothic architecture, like the French, passed through three well-marked periods. In the first, called the *Early English* (q.v.), from 1175 to about 1250, we observe (as Professor Moore has well pointed out) what is structurally a transitional Romanesque with pointed arches and Gothic details; the lancet windows are still small, the walls thick, the piers massive. In the second, or *Decorated* (q.v.), the Romanesque or Anglo-Norman characteristics tend to disappear; the windows, greatly enlarged, have superbly decorative geometric tracery; and the decorative elements of the interior are greatly multiplied and enriched. The French structural device of the vault rib is logically extended and elaborated by multiplying the ribs (tiercerons and liernes; see VAULTING). The third, or *Perpendicular*, period (1360 or 1375 to 1525) was marked by the building of many fine parish churches and by the superb chapels of St. George at Windsor, King's College at Cambridge, and Henry VII at Westminster Abbey. It is the most logical, structurally, of the three English styles, in the French sense, i.e., in the suppression of wall surfaces and the external expression of plan and structure. It was, however, during this period that fan vaulting (q.v.) was developed, in which the multiplied tiercerons and liernes were converted into a purely decorative apparel of carved paneling, their structural origin and use thus being wholly lost. (See VAULTING.) Its name is derived from the character of its tracery—the least decorative of all the historic types. The naves of Canterbury and Winchester were rebuilt in this period. To the first period belong, in the main, Lincoln, Salisbury, and Wells cathedrals and Canterbury choir; to the second, the naves of York, Lichfield, and Beverley cathedrals, and the greater part of Westminster Abbey. But hardly any cathedral or great church in England was built originally in one period in its present form; many show all the styles, from the Anglo-Norman to the Perpendicular. Particularly worthy of notice are many of the great parish churches with fine central west towers, as at Boston; or spires, as St. Mary Redcliffe at Bristol.

Special and interesting developments are seen in the semiecclesiastical academic and collegiate architecture of the universities and great mansions, especially of the fifteenth century; and in the superb "open-timber" ceilings of many late halls and churches, in which the hammer-beam (q.v.) truss is used with as clear logic and artistic skill as the French vaults of stone display. Mention must also be made of another exclusively English development, in the polygonal chapter houses of York, Wells, Salisbury, Lincoln, and Westminster. All but that of York have superb stone vaults springing from a central clustered shaft, and in design and construction they represent a remarkable achievement in the combination of structural logic with artistic purpose.

Consult: Scott, *English Church Architecture* (London, 1881); Prior, *A History of Gothic Art in England* (ib., 1900); Bond, *Gothic Architecture in England* (ib., 1906); id., *Cathedrals of England and Wales* (ib., 1908) and *An Introduction to English Church Architecture* (ib., 1913); Fairbairns, *Cathedrals of England and Wales* (4 vols., ib., 1907); Moore, *Mediæval Church Architecture in England* (New York, 1912); Van Rensselaer, *English Cathedrals* (ib., 1892). See authorities under ROMANESQUE ART; EARLY ENGLISH STYLE; PERPENDICULAR STYLE.

Germany. It is difficult to find a consistent character in German Gothic. It never became a national style, as in France and England. The Romanesque style had had so superb a development in Germany that it was difficult to introduce a new style, and not until French Gothic had reached its fullest expression in France did it find a foothold. The cathedral at Limburg copies Noyon and is still plain and heavy (1235). The singular Liebfrauenkirche at Treves (1227), on a circular plan with 12 foils, in architectural style a copy of the French church of Saint-Yved at Braisne, is the first purely Gothic church. It was natural that the Rhineland should first adopt the new style, not only from its proximity, but because it excelled other provinces artistically. On the other hand, the Germans evolved a distinctly national type in their "hall churches," with nave and aisles of equal height, of which St. Elisabeth at Marburg is an early example; later ones are at Nuremberg (St. Sebald) and Breslau (Kreuzkirche). The supremacy of the Rhineland is emphasized in the second half of the thirteenth century in three great churches —the cathedrals of Strassburg, of Freiburg, and of Cologne, where French influence is almost unmixed with German peculiarities; purest of all is the choir of Cologne (finished 1320), built long before the nave, which was not completed until late in the nineteenth century. In these Rhenish cathedrals there is much figured sculpture, which in the west portals at Strassburg equals the finest French work. Peculiarly German is the use of tracery as a purely external decoration, as embodied in the façade and spire of Strassburg and the spire at Freiburg, like delicate lace openwork. The cathedral of Halberstadt and the abbey churches of Altenberg and Xanten belong to the same style. The great cathedrals influenced a multitude of construction, especially throughout the Rhineland, and led to the formation of a German version of Gothic, much less pure, much less artistic, but interesting as a national expression, though varying in detail in local schools, as in the upper Rhine (Oppenheim), in Swabia, and Bavaria. With the middle of the fourteenth century the territory occupied by Gothic architecture had immensely increased. Nuremberg had become a great centre (St. Lawrence, St. Sebald, Frauenkirche). Great cathedrals and minsters were undertaken at Regensburg and at Ulm; also in Austria (St. Stephen, Vienna). Although great pains were taken with the decorative work, it was often lacking in artistic quality, showing in its place the German fondness for the fantastic and for ingenious mechanical intricacy of execution. The decorative vaulting ribs are not so pleasing nor so appropriate structurally as the English; the foliage work on capitals, friezes, etc., is stiff and unnatural; the proportions are not happy. One of the least happy phases was the brick architecture of the north in the Baltic Provinces and north Prussia. Consult the authorities referred to under ROMANESQUE ART; also Moore, *Gothic Architecture: Its Development and Character* (London, 1899); Dehio and Bezold, *Die kirchliche Baukunst des Abendlandes* (Stuttgart, 1887–1901); Lübke, *Ecclesiastical Art in Germany during the Middle Ages*, trans. by Wheatley (Edinburgh, 1873); Hasak, *Die gotische Baukunst der Kirchenbau*, in Stuttgart series *Handbuch der Architektur* (Stuttgart, 1887–1904).

Belgium and Holland. The Gothic of Flemish towns partook of both French and German characteristics; the German being paramount in Holland, as in churches at Utrecht, Leyden, Haarlem, etc.; the French in Belgium, as at Sainte-Gudule in Brussels and at Tournai. In the fourteenth century by the side of such great cathedrals as Antwerp, with its seven aisles and its magnificent spire, Malines, and Louvain, already corrupt in taste, are the Flemish guildhalls and town halls of Ypres, Bruges, Louvain, Mechlin, Ghent, Brussels, and Oudenarde. Consult Van Ysendyck, *Documents classés de l'art dans les Pays-Bas* (Antwerp, 1880–91).

Spain. The hybrid Byzantine-Moresco-Basilical architecture current in the Christian parts of Spain during the Moorish supremacy was beginning to be superseded by a Romanesque style of great dignity, borrowed from the south and west of France, when the French architects who were introducing it felt the first inroads of the early Gothic style—that of Saint-Germer, tempered by the Cistercian simplicity. The old cathedral of Salamanca (close of twelfth century), with its heavy proportions but genuine Gothic vaulting, shows in certain features, especially in its interesting ribbed dome, an original interpretation of Gothic principles. San Vincente at Avila, the abbey church at Veruela, and the cathedrals of Lérida, Tudela, and especially Tarragona, belong to the same period and style of heavy transition from Romanesque to Gothic. This group is as effective, well composed, and imposing as any in Europe of this time. But we do not see the links that connect it with the developed Gothic of Burgos, Toledo, León, Valencia, and Barcelona cathedrals, built in the thirteenth century, because this style was not an indigenous outcome of the older buildings, but was brought straight from France. These and other buildings of less importance are in great measure reproductions of the best French models—especially of the types of Amiens and Rheims—so that the Spanish Gothic of this middle period is second only to the French in its purity and consistency. Toledo is the most purely French of the five, León next to it. Burgos departs furthest from French types in its late Gothic *cimborio*, or lantern, and its very German traceried spires. Figure sculpture is much less important than in the French models, and these Spanish churches are more massive and less lofty than the French. The Romanesque love of heavy wall masonry persists, and the round arch is retained quite late in the main portals. Perhaps Burgos presents, on the whole, the richest and most artistic exterior, as to towers, façade, and general composition. The unity of style was sadly disturbed in the fourteenth and succeeding centuries. English, German, southern French, Italian, and Flemish elements were introduced, all more or less deviating from true Gothic design, and the national passion for rich decoration led to much extravagance in ornament and details. Of this late and surcharged phase of Gothic architecture the monastery of Belem and the mausoleum of Manoel II at Batalha in Portugal are the finest examples. But during the fifteenth century and even in the sixteenth, notable examples of Gothic design were erected, mainly free from faults of overcharged ornament, though somewhat thin and wiredrawn in detail. The nave of Seville, the entire new cathedral at Salamanca, and the fine cathedral of Segovia belong to this period. Some of the Spanish churches are immense. The Toledo Cathedral was already one of the largest in Europe, but Seville Cathedral, begun in 1401, is the largest of all mediæval structures, measuring 415 × 298 feet, or nearly 120,000 square feet.

Consult: Street, *Gothic Architecture in Spain* (London, 1865; new ed., 1914); Junghändel and Gurlitt, *Die Baukunst Spaniens* (Dresden, 1891–93), with photographic illustrations; Gade, *Cathedrals of Spain* (New York, 1911); *Monumentos arquitectónicos de España*, in course of publication by the Spanish government.

Italy. We can speak of a Gothic age but not of a Gothic style, in Italy, if by "Gothic" we mean the embodiment of the structural logic which to greater or less degree dominated the mediæval architecture of the countries so far discussed; for the Italians never mastered, nor cared to master, the principles underlying Western Gothic construction, but adopted at their good pleasure, and with modifications to suit their genius, a good proportion of western Gothic forms. The first Gothic inroads naturally appear to be by the hand of Frenchmen, such as the Cistercian monasteries of Fossanova, Casamari, San Galgano, and San Martino, as well as the gem Sant' Andrea at Vercelli, all belonging to the primitive transitional style. Then, at the mother church of the Franciscan Order, San Francesco at Assisi, the Gothic type was accepted by these monks as it was by the Dominicans. These two orders were the main agents for diffusing Gothic forms throughout Italy; for, strange to say, while northern Europe was replacing monastic architects by lay guilds in imitation of what Italy had done earlier, Italy meanwhile veered about, and nearly all her architects during the thirteenth and fourteenth centuries were monks. It is in the churches of these two orders at Bologna (San Francesco, San Domenico), Florence (Santa Maria Novella, Santa Croce), Venice (Santi Giovanni e Paolo, Santa Maria dei Frari), Rome (Santa Maria sopra Minerva), Treviso, etc., that the Italian Gothic type of church was developed, and the requirement insisted on by these preaching orders, of an interior suitable as an auditorium, determined largely their artistic character. Nowhere else are there so many churches of a single nave or with aisles nearly as lofty as the nave.

But in all these both the structural logic and the general aspect of the Western Gothic is wanting; the hold of classic tradition on the Italian taste was still strong; large wall surfaces, small windows, and large units of design were preferred to the small scale of parts, the broken surfaces, the suppression of the wall, characteristic of the French Gothic. The Italians built well, but they were decorators first of all; a church interior must offer surfaces for painting; the exterior, surfaces for marble veneer and mosaic; the west front, a screen of any desired outline, to receive carving, sculpture, and inlay. The frank resistance to vault thrusts by flying buttresses was repugnant to Italian taste; they preferred internal tie-rods of iron. Tracery was, of course, but little developed in the small Italian windows, though there are a few good examples in Florence, Pisa, and Milan.

Many so-called Gothic buildings, such as the cathedrals of Orvieto, Siena, and Lucca, are round-arched or wooden-roofed, or have columns in place of grouped piers, so that we miss every Gothic element. Even where groin vaulting is used—as at Santa Maria Novella at Florence, and Sant' Anastasia at Verona, two of the most beautiful examples in Italy—one misses the moldings of the grouped piers connecting structurally with the arcades and vaults. The wide spacing of the piers, the height of the aisles, and the lack of detail make the interiors look much smaller than they are. The rich polygonal choir with radiating chapels is almost unknown. In most parts of Italy the thirteenth century was a sterile period. There was little building in Sicily and the south. Rome suffered from the papal exile. The Lombard cities lost their freedom under tyrants. Only Venice, Florence, Siena, and neighboring cities produced much that was notable. By the end of the fourteenth century cathedral architecture had adopted Gothic features, as in the duomo (cathedral) of Florence, and in the most pretentious and un-Italian of cathedrals, that of Milan, in which German architects were employed, as well as in the huge parish church of San Petronio at Bologna. The bareness of the Italian interiors was occasionally redeemed by fresco paintings, as in San Francesco at Assisi. It was in civil architecture that the Italians excelled. The private palace of Venice, beginning as a Byzantine and Romanesque type, developed during the Gothic period into a beautiful creation, whose climax is the Cà d' Oro and the Doge's Palace. The type spread to the mainland at Padua, Vicenza, Udine, and elsewhere. The fortress palace is a different type, especially well developed at Florence, with its heavy bossed work and stern aspect. The communal palaces were monuments rivaling the cathedrals; those at Florence (Palazzo Vecchio, Bargello, etc.), Siena, Perugia, Gubbio, and those farther north at Brescia, Bergamo, Cremona, Milan, Padua, etc., are superb compositions. Consult: Mothes, *Die Baukunst des Mittelalters in Italien* (Jena, 1884); Street, *Brick and Marble Architecture of North Italy* (London, 1874); Fleury, *La Toscane au moyen âge* (Paris, 1874); Cummings, *A History of Italian Architecture* (2 vols., Boston, 1901).

GOTHIC ART. The term was originally applied by the Italians to the pointed architecture which preceded the Renaissance in derision of its supposed barbaric character. The general adoption of this term was promoted by the erroneous idea that there was something essentially Germanic in the style, and the term, though unscientific, has been too long in general use to be discarded. The Gothic period extends, roughly speaking, from the twelfth to the fifteenth century. It was a period of French ascendancy, during which artistic influences radiated from France over the rest of Europe. The control of art passed from the hands of the clergy into that of lay guilds. Gothic art had its root in the life of the cities. Nevertheless, it bore the impress of chivalry, being marked by a gentleness and charm which sometimes degenerated into sentimentality. It possessed a keen sense of humor and mockery, as is especially shown in its grotesque sculptures, and at the end of the period there was a decided tendency towards realism. During this time sculpture and painting, though highly developed, were decorative in character and strictly subordinated to architecture, to which, therefore, a separate article has been given. See GOTHIC ARCHITECTURE.

SCULPTURE

France. The School of the Ile-de-France, where Gothic architecture originated, also began the use in the lower portals of statues, at first severely stiff. About 1210–20 statues of this character became freer and more artistic, though remaining part of the architecture. Among the best early examples are the portals of the cathedral of Laon and the western portal of Notre Dame (q.v.) at Paris (1225). During the thirteenth century the use of statuary grew to an extent never before nor since practiced. It was concentrated upon the exterior of the buildings, centred about the portals, both of those of the façade, which usually terminated in three great pointed arches, and those of the side, which were often double. In order to accommodate the multitude of statues the portals were extended into porches. They were lined by rows of statues, and the tympanums were filled with reliefs. Great cathedrals of the thirteenth century were decorated with thousands of statues—like the façade of Notre Dame; the porches of Chartres, the portals, both façade and lateral, of Rheims, called the Parthenon of the Middle Ages because of the beauty and delicacy of the statuary; and Amiens, where the majestic statue of Christ, "Le bon Dieu," is eminent among many of high excellence. The subjects represented were usually biblical and allegorical cycles, like the "Creation" and "Fall of Man"; Old and New Testament history, usually terminating in the "Last Judgment," a favorite subject; allegorical figures of the trades and industries, of virtues and vices. They were, in fact, the translation into stone of the religious and philosophical ideas of the day—Bibles and sermons in stone. Occasionally the figures were executed after nature, but more usually in accordance with geometrical canons, so comprehensive that even mediocre artists could do good work. The treatment of the nude was crude, but high success was attained in draperies, which will even bear comparison with the products of Greek art. Though realistic, the figures are always of a deep religious feeling and full of dignity. This, however, is lost in the late thirteenth and fourteenth centuries, when French sculpture aims increasingly at realism, becoming naïve and humorous. The centre of artistic activity shifts to Flanders and northern Burgundy, where there was great activity at Dijon, under patronage of the Burgundian dukes. The surviving masterpiece of the school is Claux Sluter's (q.v.) "Fountain of Moses." An admirable collection of French sculpture of the late Gothic period in all its forms is on exhibition in the J. Pierpont Morgan collection and the Wing of Decorative Arts in the Metropolitan Museum of Art, New York. The English Gothic, with few exceptions, like the façade of the cathedral of Wells, was not adapted to sculptural decorations. The most important manifestation of sculpture here is in sepulchral monuments, funeral slabs and brasses, in which much realism is manifest. In northern Spain Gothic sculpture was at first influenced by French models. The façade of the cathedral of Santiago de Compostela is decorated with a wealth of statuary hardly second to that of the great French cathedrals. In the fifteenth century the French was supplemented by a German influence. The final development of Gothic sculpture in Spain was a decorative art rich to the point of profusion, as may be seen in such works as the church and cloisters of San Juan de los Reyes at Toledo, the façade of San Juan at Valladolid, and the tomb of King John II at Miraflores (near Burgos).

Germany. The thirteenth century was the golden age of German mediæval sculpture, which was doubtless influenced by contemporary French art. As the Germans still built in the Romanesque style, their churches did not afford opportunity for great cycles of plastic art, as did those of France. Their activity was confined to the interior of the church between the arches, the walls of the choir, the altar, and the pulpit; exterior decoration was rare and only practiced at the end of the epoch. The figures were full of life and dignity, less realistic than the French, and representing a calmer, higher ideal. As in the Romanesque epoch, the Saxon and Franconian schools lead. The early work of the Saxon school is best represented by the apostles and angels in the choir of the church of St. Michael, Hildesheims, and its highest development in the church of Halberstadt. Heavier and more impassioned are the figures of the South Saxon school, as exemplified in the reliefs of the pulpit and the "Crucifixion" at Wechselberg; the famous "Golden Portal" at Freiburg, the sculptures of which represent, in a grandiose manner, the "Revelation of the Kingdom of God to Man by Christ"; and that most beautiful of German sepulchral monuments, the tomb of Henry the Lion and his wife Matilda in the cathedral of Brunswick. The school reached its culmination in the latter part of the thirteenth century in the statues of the benefactors of the Church in the cathedral of Naumburg—simple, realistic, and dignified, and superb in treatment of drapery. Of equal excellence are the contemporary statues by the Franconian school in the cathedral of Bamberg, of which the "Ancient Sibyl" is the best known. The Rhenish school followed the French more closely, as is evident in the church of the Virgin at Treves and in the minsters of Freiburg and Strassburg. More characteristically German are the sculptors of the Nuremberg churches, chiefly reliefs with small figures. In the fifteenth century sculptures in wood took the place of stone, with a change of style, though not of ideals, corresponding to the new material. The figures were treated with sharper lines, and the draperies in wrinkles instead of folds; both figures and draperies were colored. From this period date the finest Gothic altars and other ecclesiastical furniture of wood. The two chief schools were the Franconian, with Nuremberg as a centre, and the Swabian at Ulm. The chief artist of the latter was Joerg Syrlin the elder, whose chief work is the choir stalls in the minster of Ulm (1469–74). The Germanic Museum and the churches of Nuremberg contain fine examples of the wood carving of that school. The chief artists were Michael Wohlgemuth (q.v.) and Veit Stoss (q.v.), who transplanted the art to Cracow, Poland. His latest and best work, however, falls in the Renaissance period.

Italy. The school of Pisa was the first to achieve the revival of sculpture in Italy, in the person of Niccola Pisano (c.1206–78). Though belonging to the Gothic epoch, his sculptures owe all their inspiration to the antique, forming a sort of Proto-Renaissance. (See SCULPTURE, *History.*) His son Giovanni (c.1250–c.1320), however, accepted the dramatic and naturalistic elements of Gothic art, and under Andrea Pisano, who was chiefly active in Florence, Gothic sculpture reached its highest development between 1310 and 1335. (See PISANO.) Its chief monuments in Tuscany are the sculptures of the façade of the cathedral of Orvieto, the marble reliefs on the campanile, and the bronze doors of the baptistery of Florence. The style was further developed by the Florentine Andrea Orcagno (c.1329–68) (q.v.), whose masterpiece is the tabernacle of Or San Michele. The most important school outside of Florence was that of Siena, whence the art was transplanted to Naples and Lombardy, with Verona as a centre. In Lombardy the school developed a series of sepulchral monuments of great magnificence and originality, the most important of which are those of the Scaliger family. The Roman school of sculpture, which came to an end c.1300, was not properly Gothic, but found all its inspiration in antiquity. (See COSMATI.) In like manner the admirable South Italian school, which developed in the early thirteenth century under the patronage of the Emperor Frederic II, found its inspiration in Greek originals. (See ROMANESQUE ART.) As elsewhere, marble and stone were the chief materials used, though bronze casting was brought to high perfection by Andrea Pisano. Italian sculptors lacked the imagination of the French, their subjects being the traditional ones of the Old and New Testaments.

PAINTING AND ALLIED ARTS

The breaking up of the wall surfaces in Gothic art left little opportunity for painting. There was, however, an increased opportunity for stained glasses (see STAINED GLASS), which during this epoch attained their highest development. The windows of the great French cathedrals were treated so as to form cycles of biblical stories and Christian legends, showing the substance of the Christian doctrine. Most of these cycles have perished, but remains survive in the chief cathedrals. The most perfect thirteenth-century example is the cathedral of Chartres, with its 146 windows; the glasses of the Sainte Chapelle in Paris have been so perfectly restored as to give an excellent idea of the best period. Good English examples are to be found in the cathedrals of Salisbury, Lincoln, and York. In the fourteenth century came a decisive change with the introduction of architectural forms in stained glasses, which had heretofore been in patterns more like tapestry. In France such windows are most frequent in the cathedrals of the south and in private houses; but the finest examples are in Germany, especially in the cathedrals of Cologne and Strassburg.

In Germany the buildings of the transitional style afforded more opportunity for mural paintings. On the Rhine a school arose at Cologne, in the fourteenth century, the mystic and sentinental inclinations of which show French influence. A Bohemian school flourished near Prague under the patronage of the Emperor Charles IV, the chief characteristic of which was a harsh realism. Midway between the two were the Franconian school, with a centre at Nuremberg, and the Swabian, the beginnings of which both fall in the fourteenth century. But towards the end of the fourteenth century painting in northern Europe began to lose its decorative character. The panel replaced fresco (q.v.), and with its use painting became an independent art. This change, which occurred first in the Netherlands in the works of the brothers Van Eyck (q.v.), emancipated painting from the bonds of the Gothic. It is more fully treated under PAINTING.

In Italy the large wall spaces of Gothic architecture afforded ample opportunity for mural painting, with the result that the later thirteenth century saw the rise of an important school of fresco painting, which culminated in Giotto (q.v.), the Florentine, and flourished throughout the fourteenth century. A little earlier the Siennese, beginning with Duccio (q.v.), who followed Byzantine models, developed an important school of panel painting. Although both the Florentine and the Siennese schools belong in time and in spirit to the Gothic epoch, their importance in the development of painting is such as to merit fuller treatment in the article PAINTING.

The Decorative Arts. The Gothic is one of the most important of all epochs in the decorative arts. Its principles were applied to all articles of ecclesiastical and worldly use with a consistency and purity comparable to the Greek and Byzantine epochs. The general subject is treated under the caption DECORATIVE ART; with more detailed treatment under such subjects as INTERIOR DECORATION; FURNITURE; TAPESTRIES; COSTUME; JEWELRY; PLATE; and the like. Especial mention should be made of the innumerable articles of ecclesiastical usage treated under such general heads as ENAMEL and IVORY CARVING, and such individual titles as ALTAR; CRUCIFIX; SHRINE; MONSTRANCE; ETC.

Bibliography. A good general treatment of Gothic art is found in the excellent, compendious histories of art recently published, the titles of which are enumerated in the bibliography of art; especially in the histories by Woermann, Springer, and Michel. For a still briefer treatment, see such manuals as Reber, *History of Mediæval Art* (New York, 1887), and Lethaby, *Mediæval Art* (London, 1904). SCULPTURE. France: Emeric-David, *Histoire de la sculpture française* (Paris, 1872); Baudot, *La sculpture française au moyen âge et à la renaissance* (ib., 1884); Frothingham, in *American Journal of Archæology* (New York, 1885); Pillion, *Les sculpteurs française du XIIIe siècle* (Paris, 1912); Humbert, *La sculpture sous les ducs de la Bourgogne* (ib., 1913). Germany: Bode, *Geschichte der deutschen Plastik* (Berlin, 1887); Hasak, *Geschichte der deutschen Bildhauerkunst im xiii. Jahrhundert* (ib., 1899); Sauerlandt, *Deutsche Plastik des Mittelalters* (Düsseldorf, 1909). Spain: Lafond, *La sculpture espagnol* (Paris, 1908); Calvert, *Sculpture in Spain* (London, 1912). England: Prior, *A History of Gothic Art in England* (London, 1900); Prior and Gardner, *An Account of Mediæval Figure Sculpture in England* (Cambridge, 1912). Italy: Perkins, *Handbook of Italian Sculpture* (New York, 1883); Venturi, *Storia dell' arte italiana*, vols. iii, iv, v (Milan, 1902), the most scholarly account; Zimmermann, *Oberitalische Plastik im frühen und hohen Mittelalter* (Leipzig, 1897); Waters, *Five Italian Shrines* (London, 1906); and the manuals of Italian sculptors by Evelyn and Walters cited in the bibliography of SCULPTURE.

GOTHIC JURISPRUDENCE. The law of the Gothic invaders who established themselves on the ruins of the Roman Empire in western Europe. The Goths had originally the same law as the other Germanic races, it being administered on the whole by the family, and only very grave criminal offenses being dealt with by the state. What makes Gothic jurisprudence especially interesting is the adoption of the Roman law and its codification. This is true of the Visigoths rather than of the Ostrogoths, who merely used the Byzantine law as it existed in Italy upon their invasion. Side by side with this, their own native law continued in force. In Spain, however, Alaric II, King of the Visigoths, in 506 issued a codification of the Roman law, the *Lex Romana Wisigothorum*, better known as the *Breviarium Alaricianum.* It was revised by King Egica (687–701) and until the thirteenth century remained the chief source of Roman law for western Europe. As such, it exerted a great influence on the development of law, especially in Spain, where Ferdinand III (1217–52) introduced it under the title of *Fuero juzo* (Lat. *forum judiciale*). Consult: Pollock and Maitland, *History of English Law*, vol. i (2d ed., Oxford, 1899); Zeumer, "Lex Wisigothorum," in *Monumenta Germaniæ historica, Leges, sectio I* (Hanover, 1894). See CIVIL LAW.

GOTHIC LANGUAGE (Lat. *Gothicus*, from *Gothus*, Gk. Γόθος, *Gothos*, Γύθων, *Gythōn*, from Goth. *Gut-þiuda*, Goth-people, AS. *Gōtan*, OSwed. *Gutar*, *Gotar*, Goths; cf. dialectic Norw. *gut*, boy). The language spoken by the Goths (q.v.). Excepting the Old Icelandic runic inscriptions (see RUNES) and a few Germanic glosses and proper names preserved in classical authors, such as Cæsar and Tacitus, Gothic is the oldest monument of all the dialects of the Germanic group of Indo-Germanic languages. Like Anglo-Saxon, Frisian, and Old Icelandic, it has undergone only the first sound shifting, or ablaut, and is consequently one of the Low Germanic languages, as contrasted with Old High German, where the second sound shifting has been carried through. (See GRIMM'S LAW.) Within this Low Germanic subgroup it is most closely akin to the Scandinavian (Old Icelandic, Old Norwegian, Old Swedish, Old Danish, and their modern representatives), so that some scholars class Gothic and Old Scandinavian together as East Germanic, contrasting this group with the Anglo-Frisian and High Germanic languages, which are then termed West Germanic. The most important points of coincidence between Gothic and Icelandic are the development of Germanic *u̯u̯* to *ggw* (as Goth. *triggws*, OIcel. *tryggr*, true, but AS. *trēowe*, OHG. *triuwi*), and the retention of final *z* (Goth. *s*, OIcel. *r*), which is lost in West Germanic (as Goth. *dags*, OIcel. *dagr*, day, but AS. *dæg*, OHG. *tag*). On the other hand, Gothic and Scandinavian diverge in many respects, especially in declension and conjugation (as runic Norse *þohtriR*, daughters, but Goth. *dohtrjus;* runic Norse *tawiþo*, I did, but Goth. *tawida*). It therefore seems better, on the whole, to regard Gothic and Scandinavian as belonging to different groups, which may be termed East and North Germanic respectively.

The sources of our knowledge of Gothic are limited. The earliest gloss preserved is in Isidor of Seville, who cites the words *medus*, mead, and *reptus*, garment. The Lex Visigothorum also contains a few Gothic words, as *leudes*, people, and *saio* (whence the Sp. *sayon*), beadle. The most important and extensive remnant of the language is the fragments of the translation of the Bible by Ulfilas (q.v.), contained in the *Codex argenteus*, now in Upsala. There are also a few words, chiefly proper names, in two documents found at Naples and Arezzo, and a fragment of a calendar.

In phonology and inflection Gothic is the most primitive of all the Germanic languages. Its pronunciation is fixed by our knowledge of that of Greek in the fourth century. Thus, as *ει* in Greek then had the itacistic value of *ī*, *ī* is represented in Gothic by *ei*. Similarly *ng* is written *gg* in Gothic in conformity with the Greek use of *γγ* instead of *νγ*. The vowels and consonants correspond in general to the pre-Germanic phonology. Short *e*, however, does not occur, being changed to *i* (as OHG. *neman*, to take, but Goth. *niman*), which is written *aí* before *h* and *r* (as Goth. *aírpa*, earth, *raíhts*, right, but OHG. *erda*, *reht*), exactly as *u* is written *aú* in a similar position (as Goth. *waúrms*, worm, *saúhts*, sickness, but OHG. *wurm*, *suht*). Pre-Germanic *z*, which became *r* in the other Germanic languages, remained *z* in Gothic, but sometimes, for reasons not yet altogether clear, it was changed to *s* (as Goth. *ausō*, ear, but OHG. *ôra*). The declension does not differ materially from the Germanic type. The pronouns of the first and second persons have, as in Old Icelandic, Anglo-Saxon, and Old Saxon, a dual. The conjugation of the verb, while harmonizing in general with the Germanic type, is marked by a number of important features. Gothic is the only Germanic language in which the verb retains the dual number (as *baírōs*, we two bear, *baírats*, ye two bear, Skt. *bharāvas*, *bharathas*; *baíraiwa*, we two bore, Skt. *abharāva*), and the third person of the imperative (*baíradau*, let him bear, *baírandau*, let them bear, Skt. *bharatu*, *bharantu*). The reduplicated preterit, which is very rare in other Germanic languages, is frequent in Gothic, 11 preterits of this type being found in the scanty remnants of the literature. As examples may be cited: *faífāh*, from *fāhan*, to seize, *haíháit*, from *haitan*, to call, *raírōþ*, from *rēdan*, to counsel, *saísō*, from *saian*, to sow. For all these preterits the Anglo-Saxon, e.g., has as corresponding forms, *fēng*, *heht*, *reord*, *sēow*. Most noteworthy of all, however, is the fact that Gothic, unlike any other member of the Germanic group, possesses a middle voice in other verbs than *hātan*, to call. Thus, Goth. *baíraza*, thou bearest thyself, *baírada*, he bears himself, *baíranda*, they bear themselves, correspond to Sanskrit *bharasē*, *bharatē*, *bharantē*.

In its vocabulary Gothic has a number of Indo-Germanic words which are not found in the other Germanic languages, as *us-anan*, to breathe forth, Lat. *animus*, breath; *aljis*, other, Lat. *alius*. On the other hand, it has no etymological representation of such common Germanic words as *do*, *say*, *fall*, *mother*, for which it substitutes *taujan*, *qiþan*, *driusan*, *aiþei*. As might be expected in a translation of the Bible, Greek and Latin loan words are quite numerous. It has likewise borrowed a few Celtic words, as *kēlikn*, tower, from Gallic *cêlicnon*, *reiks*, Ger. *Reich*, from Gallic *rīx*, and two from the Slavic *plinsjan*, to dance, and *smakka*, fig (cf. OChurch Slav. *plęsati*, smọky).

Literary Gothic is sometimes termed West Gothic, to distinguish it from East, or Krim, Gothic. The Crimean Goths preserved their identity until the sixteenth century. A collection of 86 Krim Gothic words was made in 1595 by a Fleming named Busbeck. The list, which is of great value as being the only remnant of this dialect of Gothic, is in general accurate, although some errors naturally crept in, as *hazer*, thousand, which is a loan word from Persian *hazār*. It adds a number of words to the Gothic vocabulary, as *miera*, ant, *rinek*, ring, *ada*, egg, *waghen*, wagon. In phonology Krim Gothic seems to have differed from the language of Ulfilas. The vocabulary of Busbeck contains little information on inflection. If we may judge, however, from such hints as Krim *oeghene* beside Goth. *augōna*, eyes, Krim *ahte*, eight, beside Goth. *ahtáu*, Krim *singhen*, to sing, beside Goth. *siggwan*, Krim *tag* (for **dag*), day, beside Goth. *dags*, it would seem that a change had taken place within the 12 centuries between Ulfilas and Busbeck, which was, roughly speaking, analogous to the transition from Old to Middle High German.

To the same East Germanic group as the Gothic belong the Vandal and Burgundian languages, of which only scanty fragments, chiefly proper names, survive.

The Gothic alphabet was invented by Ulfilas. He took as his basis the Greek letters, adding some Latin characters, and a few signs from the runes which were previously in use among the Goths. The number of letters was 27, of which two, corresponding to the Greek koppa and sampi, had numerical values alone, and a third, the equivalent of the Greek chi, was used only in foreign proper names. The alphabet really consisted, therefore, of 24 letters, which are, in modern editions of Gothic texts, transliterated into the ordinary Roman alphabet with the addition of *þ* and *ƕ*.

Consult: *Ulfilas*, ed. by Stamm (10th ed. of Heyne and Wrede, Paderborn, 1903); Bernhardt, *Kurzgefasste gotische Grammatik* (Halle, 1885); Braune, *Gotische Grammatik* (5th ed., ib., 1900); Streitberg, *Gotisches Elementarbuch* (Heidelberg, 1896; 3d and 4th ed., Heidelberg, 1910); Wright, *Primer of the Gothic Language* (2d ed., Oxford, 1899); Kluge, "Geschichte der gotischen Sprache," in Paul, *Grundriss der germanischen Philologie*, vol. i (2d ed., Strassburg, 1901); Skeat, *Mæso-Gothic Glossary* (London, 1868); Balg, *Comparative Glossary of the Gothic Language* (Mayville, Wis., 1887–89); Feist, *Grundriss der gotischen Etymologie* (Strassburg, 1888); Uhlenbeck, *Kurzgefasstes etymologisches Wörterbuch der gotischen Sprache* (2d ed., Amsterdam, 1900); Tomaschek, *Die Goten in Taurien* (Vienna, 1881); Loewe, *Die Reste der Germanen am Schwarzen Meere* (Halle, 1896); Wrede, *Ueber die Sprache der Wandalen* (Strassburg, 1886); id., *Ueber die Sprache der Ostgoten in Italien* (ib., 1891); Leyen, *Einführung in das gotische* (Munich, 1908); Feist, *Etymologisches Wörterbuch der gotischen Sprache mit Einschluss des Krimgotischen* (Halle, 1909); Cebulla, *Die Stellung adverbialler Bestimmungen in Deutschen* (Breslau, 1910). For editions of the Gothic texts, see the bibliography on ULFILAS.

GOTHIC LITURGY. See Mozarabic Liturgy.

GOTHIC VERSION. See Bible.

GOTH'LAND. See Gotland; also Götarike.

GOTH'OFRED. See Godefroy.

GOTH'OFRE'DUS. See Abelin, Johann Philipp.

GOTHS. The name of a powerful nation of antiquity, belonging to the Germanic race. By some writers they are thought to have had a Scandinavian origin; this was the belief of their own historian, Jordanes. The earliest notice of them extant among the writers of antiquity is that of Pytheas of Marseilles, who lived about the time of Alexander the Great and wrote a book of travels, some fragments of which have been preserved in the works of other writers. In one of these fragments, quoted by Pliny, we find mention made of a tribe of Guttones bordering upon the Germans, and living round a gulf of the sea called Mentonomon, a day's sail from the island of Abalus, where they used to gather amber and sell it to the neighboring Teutones. This gulf, there is every reason to believe, was the Frisches Haff, situated on the Prussian shore of the Baltic. The next notice of the Goths is in the *Germania* of Tacitus (chap. 44), in which they are called Gothones, and are represented as dwelling beyond the Lygii, in the same direction as the one pointed out by Pytheas, though not on the seacoast. Tacitus also distinguishes them from the Gothini, a tribe east of the Quadi and the Marcomanni, and represented by him as using the Gallic tongue. The Gothones, according to this historian, were under regal government and on that account not quite so free as the other tribes of Germany, but still they enjoyed a considerable amount of liberty. The tribes next beyond them, and dwelling immediately on the seacoast, were the Rugii and the Lemovii, whose form of government was also monarchical; their weapons, also, like those of the Gothones, were round shields and short swords.

We next hear of the Goths as settled on the coast of the Black Sea, about the mouths of the Danube, early in the third century. But at what time or under what circumstances their migration from the Baltic to the Euxine took place, it is impossible to ascertain. In their new home, which was also the country of the Getæ (q.v.) (whence, perhaps, the error that confounded them with that people), the Goths increased in both numbers and strength, so that, as early as the reign of Alexander Severus (222–235 A.D.), they made some formidable inroads into the Roman Province of Dacia. In the reign of Philip (244–249 A.D.), they ravaged that province and even advanced to the siege of Marcianopolis in Mœsia Secunda. The inhabitants ransomed their lives and property with a large sum of money, and the invaders withdrew for a time to their own country. Under the Emperor Decius, however, they again entered Mœsia to the number of about 70,000, led by a king named Cniva. Decius himself advanced to meet them and found them before Nicopolis. On his approach they raised the siege and marched away to Philippopolis, a city of Thrace, near the foot of Mount Hæmus. Decius pursued them by forced marches, but the Goths turned with fury upon the Roman legions and utterly defeated them. Philippopolis next fell before them by storm, after a long resistance, during which, and the massacre that followed, 100,000 of its inhabitants are reported to have been slain (250 A.D.). In 251 another tremendous battle took place near an obscure town called Forum Trebonii in Mœsia, in which the Romans were again defeated with great slaughter, the Emperor Decius and his son being in the number of the slain. The succeeding Emperor, Gallus, purchased their retreat by an immediate present of a large sum of money and the promise of an annual tribute for the future. The Goths now set themselves to the acquisition of a fleet, and with this, in 253, advanced to the conquest of Pityus, a Greek town on the northeast coast of the Black Sea, which they completely destroyed. In 258 they besieged and took Trebizond, when a great fleet of ships that were in the port fell into their hands. In these they deposited the booty of the city, which was of immense value, chained the youth of the seacoast to their oars, and returned in triumph to the Kingdom of Bosporus. In the following year, with a still more powerful force of men and ships, they took Chalcedon, Nicomedia, Nice, Prusa, Apamea, and Cius. In a third expedition, which numbered as many as 500 vessels, they took Cyzicus, then sailed down the Ægean, ravaged the coast of Attica, and in 262 anchored at the Piræus. Athens was now taken and plundered, and many other renowned places in Greece were either partially or wholly destroyed. Even Italy was threatened; but the danger drew the indolent Emperor, Gallienus, from his seclusion. The Emperor appeared in arms, and his presence seems to have checked the ardor and to have divided the strength of the enemy. A portion of the Goths now returned to their own country. But in 269 they again started on a maritime expedition in far greater numbers than ever. After ravaging the coasts of both Europe and Asia, the main armament at length anchored before Thessalonica. In Claudius II, the successor of Gallienus, however, the Goths found a far abler general than any they had yet contended with. This Emperor defeated their host, said to number as many as 300,000 men, in three successive battles, taking or sinking their fleet and, after an immense slaughter of their troops, pursuing such as escaped until they were hemmed in by the passes of Mount Hæmus, where they perished for the most part by famine. This, however, was only a single reverse. Aurelian, the successor of Claudius, was obliged to cede to them, in 272, the large Province of Dacia, after which there was comparative peace between the combatants for about 50 years. In the reign of Constantine, their King, Alaric again provoked hostilities, but was obliged eventually to sue for peace with the master of the Roman Empire. Under Valens they once more encountered the Roman legions, with whom they carried on a war for about three years (367–369) with tolerable success. They now began to be distinguished by the appellations of Ostrogoths and Visigoths, or the Goths of the east and the Goths of the west; the former inhabited the shores of the Black Sea, the latter the Dacian Province and the banks of the Danube. On the irruption of the Huns the Visigoths sought the protection of Valens against those barbarians and in 376 were allowed by him to pass into Mœsia, to the number of about 200,000. Great numbers of them also now took service in the Roman army; but a dispute soon arose between the Goths and their new allies, which led to a decisive battle in 378, near Adrianople, in which the Emperor Valens lost his life. The Goths now threatened Constantinople, but were not able to take it; and during the reign of Theodosius there was again a period of comparative peace.

Henceforward the history of the Visigoths and that of the Ostrogoths flow in two divergent streams. Before tracing either of these, however, it should be mentioned that the Goths for the most part became converts to Christianity about the middle of the fourth century, adopting the Arian form of belief. Here, also, it may be stated that the term "Mœsogoths" was applied to certain of the western Goths, who, having settled in Mœsia, devoted themselves to agricultural pursuits under the protection of the Roman emperors.

Visigoths. Upon the death of Theodosius the Great in 395, and the partition of the Empire between Honorius and Arcadius, the renowned Alaric (q.v.), King of the Visigoths, invaded Greece with an army of his countrymen. His retreat was purchased by giving him a commission to govern Illyricum. In 402 he invaded Italy, took and pillaged Rome (410), and was preparing to carry his arms into Sicily and Africa, when his career was arrested by death. Alaric was succeeded in the sovereignty by ATAULFUS (q.v.), or ATHAULF (410–415), who, having married Placidia, the sister of Honorius, withdrew from Italy into the south of Gaul, and about 412 crossed the Pyrenees into Spain. Athaulf was assassinated at Barcelona (415), at the instigation of a rival faction of the Goths, and his successor, Sigeric, died the same year. The choice of the Goths now fell on Wallia (415–419), who extended his power over a great part of southern Gaul and Spain and made Toulouse his capital. The Goths under this monarch greatly assisted the Romans in their contests with the Vandals and the Alani. Wallia was succeeded by Theodoric I (419–451), son of the great Alaric. He lost his life fighting on the side of the Romans against Attila (q.v.) at Châlons (see CHÂLONS-SUR-MARNE), leaving the throne to his son, Thorismund (451–453), who, however, was assassinated by his brother THEODORIC II (453–466), who was himself assassinated by his brother Euric (466–483). The reign of Euric was unusually brilliant and successful. He extended the sovereignty of the Visigoths considerably both in France and Spain, introduced the arts of civilization among his subjects, and drew up for their use a code of laws. Under his successors, Alaric II (483–507) and Amalaric (507–531), however, the kingdom of the Visigoths declined before that of the Franks. Alaric II fell by the hands of Clovis (q.v.) in battle, and Amalaric was killed by an assassin. Under the latter's successor, Theudis, the rule of the Visigoths was confined exclusively to Spain. Theudis was in his turn assassinated in his palace at Barcelona in the year 548. It will not be necessary to trace the long line of Visigothic kings that subsequently ruled in Spain from this period down to the year 711. The Visigothic power was completely broken by the Saracen invaders on the battlefield of Jérez de la Frontera. See SPAIN.

Ostrogoths. At the coming of the Huns part of the Ostrogoths had been conquered and compelled to lend aid; thus they joined Attila in his renowned expedition against Gaul and fell by thousands under the swords of their kinsmen, the Visigoths, at the battle of Châlons in 451. After this they obtained from the Empire the right to settle in Pannonia, where they were joined by the other Ostrogoths, who had at the coming of the Huns been admitted within the Roman Empire. In 476 Theodoric (q.v.), the greatest of the Ostrogoth sovereigns, succeeded to the throne upon the death of his father, Theodemir. He directed his arms almost immediately against the Eastern Emperor, Zeno, and, having gained considerable advantages over him, obtained a grant of some of the richest provinces in the Empire. Eventually he was named chief of the Imperial guard and consul for the year 484. In 488, with the consent and advice of Zeno, he planned an immense expedition against Odoacer (q.v.), King in Italy, who had held that position since 476, when he dethroned Romulus Augustulus, the last of the Western emperors. Theodoric utterly defeated Odoacer, slew him, it is said, with his own hand in 493, and reigned undisturbed sovereign of Italy until his death, in 526. The seat of his Empire was at Ravenna, and in 500 he visited Rome, when he convened a meeting of the Senate and declared that it was his intention to rule with evenhanded justice the people committed to his charge. To a great extent he fulfilled this promise and governed his subjects, upon the whole, wisely and to their advantage. The glory of his reign was, however, sullied by the execution of two of the most distinguished men of that age, Boëthius and Symmachus, upon the plea that they were engaged in a conspiracy against him. In the disorders consequent upon the death of Theodoric the Emperor Justinian sought to win back Italy to the allegiance of the emperors of Constantinople; and for this purpose he dispatched Belisarius at the head of an army into that country. In 536 Belisarius entered Rome, which he held for his master, although invited by the Goths to become himself their king; but all his and his successor's efforts to subdue the Goths were at that time utterly fruitless. Totila (541–552), a noble Goth, was elected as successor to Vitiges, the antagonist of Belisarius, but was conquered in the battle of Tagina by the Imperial general Narses in the year 552. In that battle Totila received his death wound and was succeeded by Teias, who did all that a brave man could to repair the misfortunes of his countrymen. It was to no effect, however, for he also was killed in battle in the following year. The Ostrogoths, broken and dispersed by their calamities, henceforward disappear from history as a distinct nation, their throne in Italy being filled by the exarchs of Ravenna; while the nation generally became absorbed in the indiscriminate mass of Alani, Vandals, Burgundians, and Franks, who had from time to time established themselves in the dominions of the old Roman Empire. Consult: Bradley, *The Story of the Goths* (New York, 1888); Hodgkin, *Italy and her Invaders* (Oxford, 1880–99); Bury, *History of the Later Roman Empire* (London, 1889); Gibbon, *Decline and Fall of the Roman Empire* (Bury's ed., 1896–1900); Rappaport, *Die Einfälle der Gothen in das römische Haus* (Leipzig, 1899); Villari, *Le invasioni barbariche in Italia* (Milan, 1901); Martroye, *L'Occident à l'époque byzantine: Goths et Vandales* (Paris, 1903); *Cambridge Mediæval History*, vol. i (New York, 1911).

GOTLAND, gôt′lȧnd, or **GOTHLAND** (Swed. *Gottland*). The largest island in the Baltic Sea, situated about 44 miles off the east coast of

Sweden, and forming, together with the adjacent islets of Fårön and Gotska Sandön, the Swedish Län of Gotland (Map: Sweden, F 8). Its greatest length is nearly 80 miles, its greatest breadth about 35 miles, and its area 1176 square miles. The surface is level and the soil fertile, while the climate is comparatively mild. A large part of Gotland is under forests, and the arable land constitutes only about one-fifth of the total area. The chief occupations are agriculture and the breeding of live stock. There is a government sheep farm at Roma, in the centre of the island, and the village is the junction for the railroad to the east and west coasts. Sugar beets are extensively grown, and there is a large sugar refinery, while much barley is grown and exported to the breweries on the mainland. There is also some manufacturing of lime, and a number of the inhabitants are engaged in seafaring. There are a number of good harbors, of which Slite Hamn is the most important. Pop. of the län, 1914, 55,488. Chief town Visby (q.v.). The island was in the possession of Sweden as early as the ninth century. In the Middle Ages Visby was an important member of the Hanseatic League. The island was taken several times by Denmark. It came back into the possession of Sweden in 1645. It has strong fortifications.

GOTSKOWSKI, gôts-kŏv′skē, JOHANN ERNST. See GÖTZKOWSKI.

GOTT′BUS. See COTTBUS.

GOTTENBURG, gŏt′en-bṳrk. See GÖTEBORG.

GOT′TER, FRIEDRICH WILHELM (1746–97). A German poet and dramatist, born at Gotha. He began the study of law, but was early influenced to write for the theatre. While at Wetzlar he became the friend of Goethe. Gotter wrote dramas, lyrics, elegies, tales, and operas. He was the last representative in Germany of the old French taste. Perhaps his best work is *Medea* (1775), for which Benda wrote the music (1778). His complete works were published in 1787, and a posthumous volume, *Litterarischer Nachlass,* in 1802. Consult Schlösser, *F. W. Gotter: sein Leben und seine Werke* (Hamburg, 1894).

GÖTTERDÄMMERUNG, gẽt′ẽr-dĕm′ẽr-ṳng (Ger., Twilight of the Gods). The last of the four divisions of Wagner's music drama, *Der Ring des Nibelungen.* It was first produced on Aug. 17, 1876, at Bayreuth; in the United States Jan. 25, 1888 (New York). Consult W. C. Sawyer, *Teutonic Legends in the Nibelungen Lied and the Nibelungen Ring* (Philadelphia, 1904). See RING OF THE NIBELUNGEN.

GÖTTERDÄMMERUNG. See RAGNARÖK.

GOTTFRIED, gôt′frēt, JOHANN LUDWIG. See ABELIN.

GOTTFRIED VON STRASSBURG, sträs′bōōrk (c.1200). One of the most brilliant of the German court poets of the thirteenth century. Of his personality very little is known except that he was of good but not noble family, was well educated, and is said to have held some important office, perhaps that of city clerk, in Strassburg. His great poem, *Tristan und Isolde,* written about 1215, is based upon a Celtic legend that reached Germany from France; it was given by Gottfried the form that has widely influenced later literature and furnished Richard Wagner a subject for a great opera. This epic, of 19,554 highly polished verses, gives to the story of fateful, sensual love a tragic force that is lacking in its French prototype by Thomas, and also in the earlier German epic of like name by Eilhart von Oberge (c.1180). Gottfried left the poem unfinished at the moment when Tristan, parted from Isolt by the jealous husband, King Mark, has withdrawn to Normandy and has vainly sought consolation from another Isolt (of the White Hands). Two efforts to complete the poem were made—one by Ulrich von Türheim (1236) and one by Heinrich von Freiburg (1300), both unsuccessful. Gottfried is said to have written some lyric poems also and was one of the most widely imitated poets of his day. His style is brilliant, but somewhat florid. W. Golther's edition of *Tristan* in "Deutsche National-Litteratur," vol. iv (Berlin, 1888), and Bechstein's edition (2 vols., Stuttgart, 1881) are useful. Of the translations into modern German that of W. Hertz (2d ed., ib., 1894) is said to be the best. For Gottfried's life, consult Charles Schmidt, *Ist Gottfried von Strassburg Strassburger Stadtschreiber gewesen?* (Strassburg, 1876). Consult also: K. F. B. Bergemann, *Das höfische Leben nach Gottfried von Strassburg* (Halle, 1876); Max Heidingsfeld, *Gottfried von Strassburg als Schüler Hartmanns von Aue* (Rostock, 1886); Karl Stiebeling, *Stilistische Untersuchungen über Gottfried von Strassburg* (Leipzig, 1905).

GOTTHEIL, gŏt′hīl, RICHARD JAMES HORATIO (1862–). An American Semitic scholar. He was born at Manchester, England, but early went to the United States and graduated in 1881 from Columbia College. He studied also at the universities of Berlin, Tübingen, and Leipzig (Ph.D., 1904), and at Jewish institutions in Berlin. At Columbia he lectured on Syriac languages and literature in 1886–87 and was appointed professor of Semitic languages in 1887. In 1896 he became head of the Oriental department of the New York Public Library, and in 1909–10 had charge of the American School of Oriental Research at Jerusalem. From 1898 to 1904 he was president of the American Federation of Zionists, in 1902–03 president of the Society of Biblical Literature, and after 1904 vice president of the American Jewish Historical Society. He wrote many articles on Oriental and Jewish questions for newspapers and reviews, edited the *Columbia University Oriental Series,* and the *Semitic Study Series,* with Morris Jastrow, Jr., was one of the editors of the *Jewish Encyclopædia* after 1901 and a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA, and is author of *The Syriac Grammar of Mar Elia Zobha* (1887), *Selections from the Syriac Julian Romance* (1906), *Zionism* (1914).

GOTTHELF, gôt′hĕlf, JEREMIAS. The pseudonym of the Swiss author Albert Bitzius (q.v.).

GOTTI, gŏt′tē, GIROLAMO MARIA (1834–). An Italian prelate and Cardinal of the Roman Catholic church. He was born in Genoa, where his father was a dock laborer. He joined the Carmelite Order in 1854 and, showing an unusual bent towards physical science, was made professor of mathematics and natural philosophy in one of their colleges. He was nominated general in 1881. His diplomatic ability caused him to be selected for various special missions to South American states, which he fulfilled with success, especially in Brazil. In 1895 he was created Cardinal, and later Prefect of the Congregation of Bishops and Regulars. In 1902 he was selected, on the death of Cardinal Ledochowski, as Prefect of the Propaganda (q.v.)—a still more important office, practically second in importance and responsibility to the papacy, for the succession to which his name was frequently mentioned.

GÖTTINGEN, gẽ̆′tĭng-*en*. An old town of the Prussian Province of Hanover, situated on the Leine, 36 miles north by rail east of Cassel (Map: Germany, D 3). A canal separates the old town from the new. With the exception of the fourteenth-century Rathaus, containing frescoes by Schaper, the modern theatre, and the famous Göttingen University (q.v.) with a library of 600,000 volumes, the town has no buildings worthy of mention. Of its many educational institutions, the most noteworthy, aside from the university, are the gymnasium, founded at the end of the sixteenth century, the pedagogical seminary, the trade school, the municipal museum of antiquities, and the Anatomie, with the Blumenbach collection of skulls. The Aula has a picture collection with some good examples of the early Dutch and German schools. The chief manufactures are cloth, woolen goods, sugar, chemicals, leather, scientific and musical instruments, tobacco, and famous Bologna sausages. Book publishing is important. Pop., 1900, 30,234; 1910, 37,594.

The town is first mentioned 950–960. It was given municipal rights by Otho IV at the beginning of the thirteenth century and in 1261 became the residence of the princess of Brunswick-Lüneburg. It was a prominent member of the Hanseatic League and famous for its cloth goods. Its prosperity was interrupted by the Thirty Years' War, when it fell twice into the hands of the Swedes. The establishment of the university in 1737 gave Göttingen new importance, and by the end of the eighteenth century it was a flourishing literary centre.

GÖTTINGEN, University of, or Georg-August University. A German university, founded by Georg August, Elector of Hanover, better known as George II of England. It was planned as early as 1732, there being no university in Hanover at that time, and lectures were begun two years later; but the formal foundation dates from 1737. Its organization was the work of the statesman Von Münchhausen, a man of marked ability, who remained in control for many years. Noted teachers, a well-chosen library, a large endowment, and the liberal character of the university soon gave it distinction. The Seven Years' War was a time of depression, but between 1770 and 1790 it was again much frequented. The courses in history, philology, and law were preëminent; in the study of history especially broader and more liberal conceptions prevailed. During the French Revolution and the Napoleonic wars there was another period of depression, followed by renewed prosperity. In 1823 the attendance was greater than it was in 1903; but reverses in 1831 and 1837 brought affairs for a third time under a cloud. During the latter half of the nineteenth century, however, there was a slow and steady growth, due mainly to the excellence of the instruction in mathematics and the natural sciences. The number of students has increased with remarkable rapidity during the present century, reaching 2964 in 1913. There are a large number of laboratories, clinics, seminaries, and the like. The library contains 7381 manuscripts and about 600,000 volumes; for modern books it is probably the richest in Germany. Consult Pütter, Saalfeld, and Oesterley, *Die Georg-August-Universität* (Göttingen, 1838), and *Chronik der Georg-August-Universität* (Hanover, 1890, and annually since that date).

GÖTTLING, gẽt′lĭng, Karl Wilhelm (1793–1869). A German philologist, born at Jena. He studied at Jena and later under Wolf, Böckh, and Buttmann at Berlin, and, after holding various minor professorships, was appointed professor extraordinary of philology at Jena in 1822 and full professor in 1832. In 1826 he was made director of the Philological Seminary and university librarian. His chief works are: *Ueber das Geschichtliche im Nibelungenliede* (1814); *Nibelungen und Ghibellinen* (1817); *Allgemeine Lehre vom Accent in der griechischen Sprache* (5th ed., 1835; the original edition was translated as *Elements of Greek Accentuation*, London, 1831); *Geschichte der römischen Staatsverfassung bis auf Cäsars Tod* (1840); *Gesammelte Abhandlungen aus dem klassischen Altertum* (vol. i, 1851; vol. ii 1864); and editions of Aristotle's *Politica* (1824) and *Œconomica* (1830) and of Hesiod's *Carmina* (3d ed., 1878). His *Opuscula Academica* (1869) were published and edited after his death by Fischer. Consult: *Der Briefwechsel zwischen Goethe und Göttling* (Munich, 1880); Nipperdey, *Memoria C. Goettlingii* (Jena, 1869); Lothholz, *Karl Wilhelm Göttling* (Stargard, 1876); Fischer, in the preface to the *Opuscula Academica* (Leipzig, 1869).

GOTTSCHALK, gȯt′shȧlk, or Fulgentius (c.805–c.868). A prominent figure in a theological controversy of the ninth century. He was the son of Berno, a Saxon count, and was placed by his parents at an early age in the monastery of Fulda. At the approach of manhood he tried to secure release from his vows, but failed owing to the opposition of his abbot, Rabanus Maurus (q.v.). He was permitted to remove to the monastery of Orbais in the diocese of Soissons and there devoted himself to the writings of St. Augustine and became an enthusiastic believer in the doctrine of predestination, even going beyond his master and holding to a predestination to condemnation as well as to salvation. In 837–838 he went to Italy, partly for the purpose of spreading his views. He was so successful that Bishop Noting called upon Rabanus to assist in suppressing the heretical opinions. In 839 Gottschalk became priest and then had the right to preach. This gave him a great advantage. In 845–848 he was again in Italy, and for two years was the guest of Eberhard, Count of Friuli, till Rabanus, now Archbishop of Mainz, protested. Gottschalk then wandered into Germany, preaching everywhere. Rabanus accused him of neglecting the distinction between foreknowledge and foreordination; on the other hand, he himself refused to recognize any difference between predestination to punishment and predestination to sin. At a synod held in Mainz in 848 and presided over by Rabanus, Gottschalk presented a written explanation in defense of his views; he was, however, very summarily found guilty of heresy and handed over to his ecclesiastical superior, Hincmar of Rheims, to be dealt with as his crime might deserve. He was again condemned in an assembly at Quircy in 849—this time not only as a heretic, but also as a despiser of authority and as a disturber of the Church's peace—deposed from the priesthood and sentenced to be whipped and rigorously imprisoned. The place selected for his captivity was the monastery of Hautvilliers, in the diocese of Rheims, and here he languished throughout the remainder of his life, a period of 20 years, notwithstanding the efforts of influential friends and his own pitiful appeals. He died Oct. 30, 868 or 869, and was buried in unconsecrated ground. Fragments of his works were published by Migne, *Patrol. Lat.*, cxxi (Paris, 1844–80). The Jansenists (q.v.) renewed interest in him. Consult his life by Borrasch (Thorn, 1868) and Gaudard (Saint-Quentin, 1888).

GOTTSCHALK, LOUIS MOREAU (1829–69). A famous American pianist and composer, born at New Orleans, La. At 12 years of age he took up the study of music under Hallé and Stamaty in Paris and from 1845 to 1852 made successful tours of continental Europe. In 1853 he returned to his native land and repeated his foreign successes. He visited most of the important cities and towns from one end of the United States to the other, playing or conducting his own compositions. His success and the hard work entailed undermined his health, and it only needed the fatiguing tour through Cuba and Latin America, commenced in 1865, to hasten his death, which occurred at Rio de Janeiro. His compositions, published and manuscript, covered every branch of music, but his fame as a composer centred in his pianoforte pieces, of which there are about 90. Consult C. Hensel, *Life and Letters of Louis M. Gottschalk* (Boston, 1870).

GOTTSCHALL, gŏt′shȧl, RUDOLPH VON (1823–1909). A German critic and miscellaneous writer. He was born in Breslau and studied at Königsberg, Breslau, and Berlin. His political and social sympathies with the revolutionary movement of 1848 were shown in the dramas *Wiener Immortellen* (1848), *Lambertine von Méricourt* (1850), and *Ferdinand von Schill* (1851), as well as in his first collection of poems, *Gedichte* (1850), and in a lyric epic, *Die Göttin, ein hohes Lied vom Weibe* (1853). From this time on, his work became more serene in temper and style. An epic, *Carlo Zeno* (1854), was followed by a very successful historical comedy (after the style of Scribe), *Pitt und Fox* (1854), and this by literary and historical studies, whose final titles were: *Die deutsche National Litteratur des XIX. Jahrhunderts* (1892) and *Poetik: Die Dichtkunst und ihre Formen* (1858). Noteworthy also are: *Neue Gedichte* (1858); *Mazeppa* (1859); *Reisebilder aus Italien* (1864); *Maja* (1864); *König Pharao* (1872); *Janus*, poems (1873); *Bunte Blüten*, poems (1891). Gottschall's dramas are collected in 12 volumes (1884); his literary essays in *Portraits und Studien* (1870–71), *Litterarische Totenklänge und Lebensfragen* (1885), *Studien zur neuen deutschen Litteratur* (1892), and *Zur Kritik des modernen Dramas* (1900). Of his many novels, the first, *Im Banne des schwarzen Adlers* (1876), is best. Gottschall was also active as an editor and compiler of anthologies.

GOTTSCHED, gŏt′shĕt, JOHANN CHRISTOPH (1700–66). A noted German critic and author, who for about 15 years exercised an almost undisputed literary dictatorship in Germany. He was born near Königsberg, Feb. 2, 1700, studied theology and especially philosophy at the University of Königsberg, and in 1724 went to Leipzig, where his lectures on polite literature made him speedily known, and where he became professor at the university—first of poetry (1730), then of logic and metaphysics (1734). As editor of the weeklies *Die vernünftigen Tadlerinnen* (1725–26) and *Der Biedermann* (1727), modeled after the English, he entered upon his career of untiring critical activity, continued in other literary journals, all tending towards purification of the language and towards conventional forms. In 1726 he was elected senior of the Poetic Society of Leipzig, which he reorganized, and whose influence was considerably extended by him. Directing his criticism at first chiefly against the bombast and absurd affectations of the Second Silesian school, he proceeded to lay down strict laws for the composition of poetry. He was exclusively a man of reason who sought to reduce all rules of rhetoric and poetry to philosophic principles, confining himself, however, strictly to external perception, evidently incapable of fathoming the intrinsic merit of creative genius. Voiced in all his various periodicals and treatises, this tendency was especially apparent in his *Versuch einer kritischen Dichtkunst vor die Deutschen* (1730 and repeatedly after). Here Horace and Boileau were his models. His main endeavor was directed towards the reformation of the German drama, for which he was bent upon creating a national theatre on the model of the French. Aided by his cultured wife, LUISE ADELGUNDE VIKTORIE (1713–62), a prolific writer and translator, and with the coöperation of the theatrical manager Neuber and his wife, Caroline, a clever actress, he succeeded indeed in bringing about a considerable improvement in the condition of the German stage by substituting for the prevailing operatic performances translations of French dramas and original plays, and by banishing from it forever the coarse buffooneries of the "Hanswurst" (Jack Pudding). His own tragedy, *Der sterbende Cato* (1732), fashioned after Addison's and Deschamps's work to serve as a model of what a true tragedy should be, and enthusiastically applauded by Gottsched's faithful followers, is a dreary and stilted production, barren of poetry and dramatic action. Growing ever more vain and dictatorial, and carrying his reforms to pedantic excess, he became involved in a violent controversy with the Swiss critics Bodmer (q.v.) and Breitinger, who advocated the introduction to the German public of the great English writers, especially Milton, and when, in 1748, Gottsched went so far as to belittle the rising genius of Klopstock (q.v.), he drew upon himself ridicule and scathing criticism. The new literary spirit inaugurated by Lessing (q.v.) remained a closed book to him. Long before (1741) he had also fallen out with Caroline Neuber regarding practical stage matters and even placed himself in opposition to his wife. Gradually his influence and authority declined, leaving him embittered and isolated, and thus it came to pass that this worthy man, who in his day had done yeoman service for German literature, became a byword for foolish pedantry years before his death, which occurred at Leipzig, Dec. 12, 1766. But his services to the German language and literature, especially to the drama, are now looked upon with more favor. He left at least one important work, *Nötiger Vorrat zur Geschichte der deutschen dramatischen Dichtung* (1757–65), a valuable, though incomplete, repertory of information intended to embrace an account of all dramatic productions in Germany from 1450 to 1760. Consult: Danzel, *Gottsched und seine Zeit* (Leipzig, 1848); Fischer, *Gottsched und sein Kampf mit den Schweizern* (ib., 1892); Wolff, *Gottscheds Stellung im deutschen Bildungsleben* (Kiel, 1895–97); Gottsched's biography by G. Waniek (Leipzig, 1897).

GÖTZ, gẽts, Georg (1849–). A German classical scholar, born at Gompertshausen and educated at the University of Leipzig. For two years he was a private tutor in St. Petersburg and from 1875 to 1879 taught in the Russian seminary at Leipzig. He then became professor at Jena. His most important work was in early Latin. He was one of the editors of the "triumvirate" edition of Plautus and edited the *Corpus Glossarum Latinarum* (1888–1903) and Varro's *De Lingua Latina*, with Schoell (1910) and *De Re Rustica* (1911).

GÖTZ, Hermann (1840–76). A gifted German composer, born in Königsberg, Prussia. He did not begin his musical studies until his eighteenth year and from 1860 to 1863 was a pupil at the Stern Conservatory, Berlin, where his teachers were Stern, Von Bülow, and Ulrich. Upon leaving the conservatory he became organist of a church at Winterthur, Switzerland. Götz's place among composers is permanently established by his one opera, *Der Widerspenstigen Zähmung*, first performed at Mannheim on Oct. 11, 1874. In addition to some orchestral and choral compositions he left an unfinished opera, completed by his friend Ernst Frank, called *Francesca von Rimini*. Ill health, brought on by overwork, caused him to retire in 1870 to Hottingen, near Zurich, and he died there, Dec. 3, 1876. Consult A. Steiner, *Herman Götz* (Zurich, 1907).

GÖTZEN, gẽts′*e*n, Friedrich, Count (1767–1820). A Prussian general, born at Potsdam. He entered the army in 1783 and was appointed major of cavalry on the general staff in 1801. He had the fullest confidence of King Frederick William III, who appointed him his chief adjutant in 1804, and at whose request he was sent to organize the defense of Silesia. As Governor-General (1807–13) of that province, he displayed extraordinary patriotism during the critical period of the Napoleonic invasion and was chiefly instrumental, by his skill and persistent energy, in saving that province to the Prussian crown.

GÖTZEN, Gustav Adolf, Count von (1866–1910). A German traveler, born at the castle of Scharieneck, Silesia. He undertook a journey to the Kilimanjaro, which was highly successful, and on his second tour traversed the entire continent of Africa from Pangani, German East Africa, to the mouth of the Congo. The journey, undertaken in association with Drs. von Prittwitz and Kersting, was begun Dec. 21, 1893, and was terminated, after almost incredible difficulties and hardships, Nov. 29, 1894. The interesting discoveries made by Götzen on this tour are described by him in the volume entitled *Durch Afrika von Ost nach West* (1895). In 1896 he was sent to Washington as military and naval attaché, in 1900 was appointed Governor of German East Africa, and from 1901 to 1906 major and commander of the defensive forces there stationed. In 1908 he was Prussian Ambassador to the Hanse Towns.

GÖTZENBERGER, gẽts′*e*n-bĕrg-ẽr, Jakob (1802–66). A German historical painter. He was born in Heidelberg and studied with Cornelius, first at Düsseldorf, then in Munich. With Förster and Hermann he painted (1832), in the aula of the University at Bonn, the frescoes representing the faculties, for which he had made studies in Rome and Naples in 1828. A cycle in fresco in the chapel at Nierstein, Hesse, made his reputation. He was appointed court painter and inspector of the gallery at Mannheim, visited Paris and London with Cornelius, and in 1844 decorated the Trinkhalle at Baden-Baden with illustrations of the legends of the Black Forest. In 1847 he went to England, where he painted many portraits and some frescoes, of which those in Bridgewater House for Lord Ellesmere and four great compositions after an old English ballad in Northumberland House are the most noteworthy.

GÖTZKOWSKI, gẽts-kŏv′skė, or **GOTSKOWSKI**, Johann Ernst (1710–75). A Prussian merchant and patriot, born at Konitz. In 1730 he removed to Berlin, where, supported by the patronage of the crown, he introduced the manufacture of porcelain in 1761 at the request, it is said, of Frederick the Great. After the battle of Kunersdorf (1759), so damaging to Prussia, he used his influence with the Russian general who was laying siege to Berlin (1760) to guard the city against plundering and to reduce the heavy tribute levied upon the inhabitants, and then paid a large part of it himself. Consult his *Mémoires d'un négociant patriote* (Berlin, 1769).

GÖTZ VON BERLICHINGEN, or **GÖTZ OF THE IRON HAND.** See Berlichingen, Götz von.

GOUCH′ER, John Franklin (1845–). An American educator, born at Waynesboro, Pa. He graduated from Dickinson College in 1868 (A.M., 1872; LL.D., 1899) and after 1869 held several Methodist Episcopal pastorates in Baltimore. He was president of the Woman's College of Baltimore (now Goucher College) from 1890 to his retirement in 1908. He projected and built several new churches in Baltimore; directed the organization of the Anglo-Japanese College at Tokyo, Japan; helped establish vernacular primary and secondary schools in India; founded the West China and Korean Mission of his church, and made numerous tours of mission and school inspection, especially in the Far East. He was elected president of the board of governors of the West China Union University, Chentu, China, and president of the American Methodist Historical Society. His publications include: *Young People and the World's Evangelization* (1905); *The Sunday School and Missions; Christianity and the United States* (1908); *Growth in the Missionary Concept* (1911); *Principles of Stewardship.*

GOUCHER COLLEGE. An institution for the higher education of women in Baltimore, Md. Until March 31, 1910, the institution was known as the Woman's College of Baltimore, and was founded in 1844 under the auspices of the Methodist Episcopal church. The name of the college was changed in recognition of the munificent gifts of the Rev. John Franklin Goucher and of his wife, Mrs. Mary Cecilia Goucher, whereby the founding of the college was made possible, and in further recognition of the distinguished services of Dr. Goucher in the organization of the college and its conduct during the presidency beginning Sept. 1, 1890, and ending June 30, 1908. The college is situated in the north-central part of Baltimore, more than a mile from the nearest business sections. The principal buildings are Goucher Hall, Bennett Hall, and Catherine Hooper Hall. Bennett Hall contains the gymnasium, baths, and swimming pool. There are three dormitories, and the college is provided with laboratories, libraries, and collections for its work. There are several memorial endowments and scholarships for the benefit of the students. The students in 1913–14 numbered 386, of whom 371 were candidates for the degree of A.B. and 15 were unclassified students. Only one degree is given. The faculty and officials of the college numbered 45. The library contains about 12,000 volumes. The productive funds amount to about $525,000 and the total income to $75,000. The president in 1914 was William Westley Guth, Ph.D. John F. Goucher, D.D., LL.D., was president emeritus.

GOUDA, gou'dȧ (Dutch *Ter Gouw*, on the Gouw). A town of Holland, situated at the confluence of the Gouw and the Yssel, 12½ miles northeast of Rotterdam (Map: Netherlands, C 2). In the market place stand the Late Gothic town hall and the church of St. John, dating from 1485 and restored in 1552, with magnificent stained-glass windows, most of them made by the brothers Crabeth between 1555 and 1577. Gouda has a library located in the church and a museum of antiquities. The chief industries are brick pottery and pipe making, the Gouda pipes having formerly been very famous. Stearin candles are also manufactured here, and an active trade is carried on in dairy products, grain, and especially in the white Gouda cheese, for which the town is famous. The town has also flourishing cigar factories and oil refineries. The canal of Gouda connects Amsterdam with the Lek. Pop., 1889, 19,800; 1910, 29,704.

GOUDIMEL, go͞o'dē'mĕl', Claude (c.1505–72). A famous French musician and composer of the sixteenth century. About his life little is known beyond the facts that he was born in Besançon, lived in Paris in 1549, and in Metz from 1557 to ?1567. On account of his association with Huguenot circles he was supposed to have been a Huguenot himself, especially because of his composition of the version of the Psalms by Marot and De Bèze (in 8 books, 1551–66). Sometime between 1565 and 1568, during the persecution of the Huguenots, Goudimel left Metz, and lived again at Besançon. Shortly before his death he was in Lyons, where, at the time of the Massacre of St. Bartholomew, he lay seriously ill. As a suspected Huguenot he was murdered and his body thrown into the Saône. Brenet has proved beyond a doubt that Goudimel was not (as has generally been believed) the founder of the great school of Rome. It is even doubtful whether he ever visited Italy. His first compositions (32 chansons) appeared in Paris in 1549. He is best known for his magnificent setting of the above-mentioned Psalms, which passed through many editions. His other compositions include several masses, magnificats, motets, and all the Odes of Horace (1555). Consult M. Brenet, *Claude Goudimel, Essai bio-bibliographique* (Besançon, 1898).

GOU'DY, Henry (1848–). A British jurist. He was born in Ireland and was educated at the universities of Glasgow, Edinburgh, and Königsberg. Upon the establishment of the *Judicial Review* he became its editor and conducted that publication until 1893. He was professor of civil law at Edinburgh from 1889 to 1893, when he was called in the same capacity to Oxford. Besides several contributions to the *Encyclopædia Britannica*, he was coeditor of the *Manual of Local Government in Scotland* (1880) and also edited the second edition of Muirhead's *Private Law of Rome* (1898). His *Treatise on the Law of Bankruptcy in Scotland* (1886; 3d ed., 1903) is regarded as a valuable contribution to that subject. He is author also of *Trichotomy in Roman Law* (1910).

GOUFFIER, Comte de Choiseul. See Choiseul-Gouffier.

GOUGE, go͞oj, Thomas (1609–81). A nonconformist divine and philanthropist, born in London, Sept. 29, 1609, the son of William Gouge (q.v.). He was educated at Eton and Cambridge, and was vicar of St. Sepulchre's, London (1638–62). Here he won distinction by well-directed efforts to provide work for the able-bodied poor. In 1662 he resigned his living because of the Uniformity Act and retired to Hammersmith. In 1672 he began making semi-annual journeys to Wales for the purpose of establishing schools where English should be taught and circulating religious books. He wrote himself several works and numerous tracts, some of which were translated into Welsh. His collected works were published in London (1706). His *Surest and Safest Way of Thriving* was reprinted, with introduction by Thomas Binney (1856). Consult his biography by Clarke, in *Lives of Eminent Persons* (London, 1683).

GOUGE, William (1578–1653). A Puritan divine. He was born at Stratford-le-Bow, Middlesex, Dec. 25, 1578; was educated at Eton and Cambridge; became preacher at St. Anne's, Blackfriars, London, in 1608, and continued there till his death, Dec. 12, 1653. He was one of the leading members of the Presbyterian party in England, sat in the Westminster Assembly, and was prolocutor of the first provincial assembly of London in 1647. At college the strictness of his life gained him the name of the "arch Puritan," and later he was affectionately known as the "Father of the London Ministers." As a writer, he is best known by his elaborate *Commentary on the Epistle to the Hebrews* (1655), to which is prefixed a life by Thomas Gouge.

GOUGES, go͞ozh, Olympe de (1748–93). A pioneer of feminism, born at Montaubun in the south of France. Louis XV was reputed her father, but this responsibility should probably be laid at the door of the poet and Marquis Le Franc de Pompignan. Married at 17, Olympe soon left her husband and fled with a rich lover to Paris, where her glowing beauty and eccentric personality made her a figure, and where her "affairs" were numerous, open, and flagrant. After a time, however, she "found the trade of gallantry very ignoble," turned literary, and wrote plays, novels, and endless pamphlets. Her claim to fame rests, however, not on these inartistic productions, but upon her championship of the rights of her sex. She was the first to demand of the Revolution the same rights for women that it gave to men. Her feminism, startling in its modernity, embraces most of the ideas for which "advanced" women strive to-day. It reached its best expression in the pamphlet manifesto, *Declara-*

tion des droits de la femme et de la citoyenne (1791), which appeared when Mary Wollstonecraft was in France, and which may have influenced her *Vindication of the Rights of Woman* (1792). Throughout Olympe's career a strain of heroism and idealism blended with frailties and absurdities. A brave offer to defend Louis XVI when his life hung by a thread, followed by attacks she made on men and policies of the hour, brought her to the guillotine in 1793. Consult: Michelet, *Femmes de la Révolution* (Paris, 1854); L. Lacour, *Trois Femmes de la Révolution* (ib., 1900); and for bibliography, J. M. Quérard, *La France littéraire* (12 vols., ib., 1827–64).

GOUGH, gŏf, Hubert de la Poer (1870–). An English soldier, educated at Eton and Sandhurst. In 1889 he joined the Sixteenth Lancers, and he saw service in the Tirah expedition in 1897–98 and in South Africa from 1899 to 1902. After commanding the Sixteenth Lancers from 1907 to 1911, he took the command of the Third Cavalry Brigade, with which he was at Curragh, Ireland, in 1914. For services in the European War he was promoted major general in November, 1914.

GOUGH, Hugh, Viscount (1779–1869). An eminent British soldier, born at Woodstown, Ireland. He joined the British army in 1794, served at the Cape of Good Hope in 1795 and in the Peninsular War (1809–13), became a major general in 1830, and in 1837 went to India. He commanded the land forces in the Opium War of 1840–42, compelling the Chinese to sign the Peace of Nanking. In 1843, as commander in chief of the forces in India, he routed the Mahrattas at Maharajpur, and for his brilliant victories at Mudki, Firozshah, Aliwal, and Sobraon in the first Sikh War (1845–46) was given a peerage. In the second Sikh War (1848–49) he was again successful, achieving the victory of Gujarat, following upon an indecisive battle at Chillianwalla; but the heavy losses of the English at Chillianwalla brought criticism upon him, and he was superseded by Sir Charles Napier. Gough was created Viscount and was pensioned in 1849, and in 1862 became field marshal.

GOUGH, ga̤f, John Bartholomew (1817–86). A well-known American temperance lecturer. He was born in Kent, England, but at the age of 12 went to America as an apprentice and worked on a farm in Oneida Co., N. Y. In 1831 he went to New York City, where he was engaged in bookbinding; but he was soon discharged for habitual drunkenness, and was forced to make a living by giving recitations and singing comic songs in bar rooms. He was married in 1839 and established a shop for bookbinding; but his drunken habits reduced him to poverty and delirium tremens and probably caused the death of his wife and child. A benevolent Quaker induced him in 1842 to take the pledge; and he attended temperance meetings and related his experience with such effect as to influence many others. Some time after signing the pledge he had a short relapse into drunkenness; but an eloquent confession restored him to favor, and he lectured in various parts of America with great success. In 1853 he was engaged by the London Temperance League to lecture two years in the United Kingdom, where he drew large crowds by his earnest and, by turns, amusing and pathetic orations. From this time onward until his death he continued to lecture, for the most part on the question of temperance, and uniformly drew large crowds. He published: An *Autobiography* (1846); *Orations* (1854); *Temperance Addresses* (1870); *Sunlight and Shadow: or, Gleanings from my Life Work* (1880).

GOUGH, gŏf, Richard (1735–1809). An English antiquary, born in London and educated at Cambridge. He was director of the Society of Antiquaries of London from 1771 to 1791. As a result of his extensive travels, he published many works, including: *Anecdotes of British Topography* (1768; enlarged, 2 vols., as *British Topography,* 1780); *Sepulchral Monuments in Great Britain* (3 vols., 1786–99); *A Catalogue of the Coins of Canute, with Specimens* (1777); *Collection of all the Wills of the Kings and Queens of England* (1780); *Coins of the Seleucidæ, Kings of Syria* (1803); *Antiquities and Memoirs of the Parish of Ulyddle* (1833). Noteworthy also is his excellent edition of Camden's *Britannia* (3d ed., 3 vols., 1806), which embodies the results of explorations extending over a period of more than 20 years.

GOUIN, go͞o'ăN', Sir (Jean) Lomer (1862–). A Canadian lawyer and statesman. He was born at Grondines, Province of Quebec, and was educated at Sorel and Lévis colleges and at Laval University. Called to the bar in 1884, he early became distinguished as a lawyer. In 1891 he was an unsuccessful Liberal candidate for the House of Commons, but he was elected to the Provincial Legislature in 1897; in 1900–04 he was Commissioner of Public Works in the Liberal administration of Simon Napoleon Parent, and after 1905 he was Premier and Attorney-General. He was chairman of the Interprovincial Conference held in Ottawa in 1906 and a delegate to the Interprovincial Conference there in 1910; edited a special edition of the Quebec Municipal Code; in 1907 was made an officer of the Legion of Honor, in 1908 was knighted during the Quebec centenary celebration, and in 1910 was elected *bâtonnier-general* of the provincial bar.

GOUJON, go͞o'zhôN', Jean (?1520–c.68). The greatest sculptor of the Renaissance in France. He was also an architect, although, as he always worked in conjunction with great architects, it is not possible now to determine how much of the architecture of his works belongs to him. The leading quality of his work is its architectonic quality—the absolute harmony which prevails between it and the architecture which it adorns. But, as sculpture pure and simple, it is of a high order, showing a lofty, but at the same time a free, realization of the antique, coupled with a wholesome naturalism and a fine feeling for style. His figures show a peculiar flavor of preciosity characteristic of the period and his personality.

Goujon's origin is entirely unknown. A contract for two columns supporting the organ of the church of Saint-Maclou at Rouen, dated Aug. 9, 1541, bears his name and points to Normandy as his native country. In the porch of this church are two carved wooden doors of great beauty, which are definitely in the style of Goujon, although there is no proof that they were made by him. A record of 1542 ascribes to him the statue of the Archbishop Georges II d'Amboise on the monument of the Cardinal Georges I d'Amboise in the cathedral of Rouen. When the Archbishop became Cardinal, this statue was replaced by the present one. It has been conjectured that Goujon was also employed on the monument to Louis de Brézé in the cathedral.

Goujon's long association with the great architect Pierre Lescot begins about 1541, when they accomplished together the restoration of the church of Saint-Germain-l'Auxerrois in Paris. Two of the bas-reliefs have been preserved in the Museum of the Louvre. Goujon was employed in 1545–46 by the Constable de Montmorency in the decoration of his château at Ecouen. The bas-reliefs of the Hôtel Carnavalet are ascribed to the year 1547. Goujon erected an extraordinary loggia with fountains at the corner of the old Cemetery of the Innocents in the Rue aux Fers, Paris. When the cemetery was discontinued (June 19, 1786), this charming work, bas-reliefs of the nymphs of the French rivers, was rearranged in a public square, and is still called the Fountain of the Innocents. Probably about 1550 to 1553 Goujon was employed at the château of Arrèt, under Philibert de l'Orme. The fine group of Diana and a stag which decorated one of the courts of this château is now in the Museum of the Louvre. From 1546 until the end of his life Goujon was associated with Pierre Lescot in the construction and decoration of that portion of the Louvre which was built by Henry II at the southwestern angle of the old Louvre quadrangle. The figures on the sides of the round windows are notable. The most beautiful and important part of his work on the Louvre is the gallery for musicians, which stands in the hall now occupied by a part of the Museum of Antiquities. The four caryatides which support this gallery have been compared with the caryatides of the Erechtheion at Athens. The date of the last one is Sept. 6, 1562. Goujon, like many of the great artists of his day, was a Huguenot and he may, like other coreligionists, have been dismissed from the royal service that year. The tradition that he was killed in the Massacre of St. Bartholomew (Aug. 24, 1572) has been completely disproved. From the testimony of a French Protestant interrogated before the Inquisition at Bologna in 1568, it appears that Goujon lived in exile at Bologna from c.1563 and died between that time and 1568.

Bibliography. For reproductions of his work, see *Œuvre de Jean Goujon* (Paris, 1844), text by Pottier; and his biography by Vitry (ib., 1908) and Lister (London, 1903); Gonse, *La sculpture française depuis le XIVème siècle* (Paris, 1895); Palustre, *La renaissance en France*, vol. ii (ib., 1881); Lami, *Dictionnaire des sculpteurs de l'école française* (ib., 1898); and Montaiglon, "Jean Goujon et la vérité sur la date de sa mort," in *Gazette des Beaux-Arts*, vols. xxx–xxxi (ib., 1884–85).

GOULBURN, gōl′bŭrn. An episcopal city in New South Wales, Australia, 134 miles southwest of Sydney, on the left bank of the Wollondilly River, and on the Great Southern Railroad (Map: Australasia, G 6). Gold and copper are found near by, and there are tanneries, boot and shoe factories, flour mills, and breweries; but the main business of the region is agriculture. The city, which stands at an elevation of 2129 feet above sea level, is well-built; it possesses an Anglican and a Roman Catholic cathedral, both attractive buildings, and owns its gas and water works. Pop., 1901, 10,680; 1911, 10,900.

GOULBURN, Henry (1784–1856). An English statesman. He was born in London, was educated at Trinity College, Cambridge, and entered Parliament for Horsham in 1808. Four years later he became Undersecretary for War and the Colonies, and was one of the peace commissioners at the close of the war with the United States (1814). His further political appointments were: member of the Privy Council and Secretary to the Lord Lieutenant of Ireland (1821); Chancellor of the Exchequer under the Duke of Wellington (1828); Home Secretary (1835); and Chancellor of the Exchequer in the cabinet of his intimate friend Sir Robert Peel (1841). He retired from the government in 1846, but represented Cambridge University in Parliament until his death.

GOULD, gōōld, Augustus Addison (1805–66). An American zoölogist, born at New Ipswich, N. H., April 23, 1805. He graduated at Harvard in 1825, and took his medical degree five years later. He was an instructor in botany and zoölogy at Harvard for two years, and practiced medicine in Boston. He was one of the leading conchologists of his time, and was one of the most active naturalists in America. He published: *System of Natural History* (1833); *The Invertebrate Animals of Massachusetts* (1841); *Principles of Zoölogy*, with L. Agassiz (1848).

GOULD, Benjamin Apthorp (1787–1859). An American educator, born at Lancaster, Mass. He graduated at Harvard in 1814, and was principal of the Boston Latin School from that time until 1828, when the failure of his health compelled him to resign. He prepared for the school several textbooks, including *Adams's Latin Grammar* (1825) and editions of Latin classics.

GOULD, Benjamin Apthorp (1824–96). An American astronomer, born in Boston, Mass. He graduated at Harvard in 1844, and received the degree of Ph.D. from Göttingen in 1848; established the *Astronomical Journal* in 1849, continued it until 1861, and resumed its publication in 1885. In 1852 he was appointed director of the longitude determinations of the Coast Survey, and in 1867, after having organized and greatly developed this service, retired. From 1855 to 1859 he was director of the Dudley Observatory, at Albany, N. Y., and in 1866 established, by means of the Atlantic cable, the relations in longitude between American and European stations. From 1865 he was much interested in the study of the southern celestial hemisphere, and in 1870 established at Córdoba, Argentina, the National Observatory, where he accumulated the material for his *Uranometría Argentina* (1874) and *Catálogo de zonas estelares* (1884), both classic in the literature of astronomy. In 1872, with the assistance of the Argentine government, he further established a system of meteorological stations extending southward to Tierra del Fuego and eastward to the Atlantic. He returned to the United States in 1885. He was a charter member of the National Academy of Sciences, was elected president of the American Association for the Advancement of Science in 1868, and was the recipient of many foreign distinctions. His contributions to the scientific knowledge of the southern celestial hemisphere must be regarded as having marked an epoch in the modern study of astronomy.

GOULD, Edwin (1866–). An American capitalist, son of Jay Gould and brother of Helen Miller Gould Shepard, George Jay, Howard, and Frank Jay Gould. Born in New York

City, he studied for a time at Columbia College. He was chosen a captain in the Seventy-first Regiment of the State National Guard. He served as secretary of the St. Louis, Arkansas, and Texas Railway from 1888 until it was reorganized as the St. Louis and Southwestern in 1891, and afterward as vice president and president. He organized the Continental Match Company in 1894 (consolidated with the Diamond Match Company in 1899); was president of the Bowling Green Trust Company until it was merged in the Equitable Trust Company; and became vice president of the American Writing Paper Company, president of the Five Boroughs Realty Company, and director in many railroad and other corporations.

GOULD, Sir Francis Carruthers (1844–). An English caricaturist, born in Barnstaple, the son of an architect. He became a bank clerk and then a member of the London Stock Exchange, where his amusing portraits of members directed attention to him. An ardent Liberal, he used his gift as a caricaturist for political purposes in the *Pall Mall Gazette* from 1887 until 1892, when it became a Conservative paper, and then (1893) in the *Westminster Gazette*, of which he became assistant editor in 1895 and towards the success of which he contributed greatly. Principally for his work on the *Westminster Gazette*, he was knighted in 1906. From 1879 on he usually contributed to the Christmas number of *Truth*, sometimes in colors. He published *Who Killed Cock Robin?* (1897), *Tales Told in the Zoo* (1900), *Froissart's Modern Politics* (1900–02), and the annual *Westminster Cartoons* (1895–1905).

GOULD, George Jay (1864–). An American capitalist, born in New York City, the eldest son of Jay Gould. He was privately educated, and afterward assumed control of large railway interests. In 1888 he became president of the Little Rock and Fort Smith Railway; in 1893 of the St. Louis, Iron Mountain, and Southern, the International and Great Northern, and the Missouri Pacific. From 1892 to 1913 he was president of the Manhattan Elevated Railway of New York City, and he also became director of many other railroad companies.

GOULD, Hannah Flagg (1789–1865). An American author, born at Lancaster, Mass. She wrote extensively for magazines and newspapers, and some of her verses were at one time very popular. They are simple and pleasing, with a decided moral tone. A volume of her poems appeared in 1832, a second in 1836, and a third in 1850. Among her other works are: *Gathered Leaves*, prose sketches (1846); *The Diosma*, composed partly of original and partly of selected poems (1851); *The Youth's Coronal* (1851); *The Mother's Dream* (1853); *Hymns and Poems for Children* (1854).

GOULD, Helen Miller. See Shepard, Helen Miller Gould.

GOULD, James (1770–1838). An American jurist, born in Branford, Conn. He graduated at Yale in 1791, was admitted to the bar in 1798, and thereafter almost continuously until 1833 was connected with the famous Litchfield Law School (see Reeve, Tapping), first as professor, and from 1820 to 1833 as superintendent. From 1816 to 1818 he was a justice of the Connecticut Supreme Court. He published *A Treatise on the Principles of Pleading in Civil Actions* (1832; 6th ed., ed. by F. F. Heard, 1909).

GOULD, Jay (1836–92). An American capitalist, born in Roxbury, Delaware Co., N. Y. He passed his boyhood on his father's farm and was educated at Hobart Academy. In 1852 he entered a hardware store which his father had established; but although he did not neglect the business, his evenings were devoted to the study of surveying, at which he spent the years from 1852 to 1856, preparing and publishing maps of Albany and Delaware counties, of various counties in Ohio and Michigan, and of a proposed railway from Newburg to Syracuse. In 1856 he published a *History of Delaware County*. In the same year he engaged in the lumber and tanning business in western New York, selling out just before the panic of 1857 and removing to Stroudsburg, Pa., where he became the controlling director in a small bank. It was shortly after this that he first became interested in railroading. In the great financial depression following the panic of 1857 he disposed of his bank stock and bought a controlling interest in the Rutland and Washington Railroad running from Troy, N. Y., to Rutland, Vt., for 10 cents on the dollar. Of this company he became president, treasurer, and general manager, and subsequently brought about a consolidation of his road and the Rensselaer and Saratoga Railroad. In 1859 he sold out his stock in the consolidated roads at 120, and removed to New York, where he embarked in the brokerage business. He made a special study of railway stocks and set out to obtain control of the Erie Railroad, then in financial straits, and the object of strife between the Drew and Vanderbilt interests. By methods new in railway speculation, Gould secured control of the road, and in 1868 was elected its president. His administration of the road may, as he asserted, have reclaimed it from bankruptcy, but it saddled it with a debt of $64,000,000 and resulted in its paying no dividends until 1891. The manipulation of the Erie was the first of a long series of speculations by which Gould obtained the mastery of some of the greatest railway corporations in the country. His method of obtaining control was the same in almost every instance: to depress the value of the stock which he sought to control and acquire the property during the period of depression. By these methods in the next few years he obtained control of the Union Pacific, which he held from 1873 to 1883, during which time the value of its stock rose from 15 to 75; of the Missouri Pacific, which under his management and by consolidation and extension developed from a short line 287 miles long with earnings of $280,000 a month to an immense system with earnings, before his death, stated at $5,100,000 a month; of the Wabash, the Texas Pacific, the St. Louis and Northern, and the St. Louis and San Francisco. In 1880 he controlled fully 10,000 miles of road, more than one-ninth of the mileage of the country. Gould also consolidated competing telegraph lines into the Western Union system in 1881 and obtained control of the Manhattan Elevated Railroad in the same year. What has been considered the most indefensible of all his actions was his entering with "Jim" Fisk, who was also his partner in some of his railroad deals, into a scheme to corner the gold market, which resulted in the disastrous "Black Friday" panic of 1869.

GOULD, John (1804–81). An English ornithologist, born at Lyme Regis. In 1827 he was appointed taxidermist to the Zoölogical Society of London. In 1832 he published his *Century of Birds from the Himalayan Mountains,* based on a collection of bird skins obtained from that region, and containing 80 plates from drawings by himself. He was elected a fellow of the Royal Society in 1843. His works include 40 other volumes, with careful plates. The most important of them are *The Birds of Australia* (7 vols., 1840–48), with 601 plates, material for which was largely collected on a scientific journey to that continent and the adjacent islands; a *Monograph of the Trochilidæ* (humming birds) (1849–61), with 360 plates; and *The Birds of Great Britain* (5 vols., 1862–73), with 367 plates. His Australian birds are in the Academy of Natural Sciences of Philadelphia.

GOULD, Sabine Baring-. See Baring-Gould, Sabine.

GOULD, Thomas R. (1818–81). An American sculptor, born in Boston. He was at first a merchant and did not adopt sculpture as a profession until after the Civil War. He practiced in Boston until 1868, when he established a studio in Florence, Italy. Among his works are ideal busts of "Christ" and "Satan"; the "West Wind," Mercantile Library, St. Louis; portrait busts of Emerson, John A. Andrew, and the elder Booth; a statue of John Hancock in the town hall of Lexington; a colossal bronze statue of King Kamehameha I, Honolulu; "A Puritan," on Cambridge (Mass.) Common, completed by his son. Although a man of fine culture and true personal worth, he was deficient in technical training and real sculptural feeling. Consult Tuckerman, *Book of the Artists* (New York, 1867).

GOULDING, go͞ol′dĭng, Francis Robert (1810–81). An American author. He was born at Roswell, Ga., and was educated at the University of Georgia and at the Presbyterian Theological Seminary, Columbia, S. C. His story for boys, *Robert and Harold, or the Young Marooners on the Florida Coast,* first published in 1852, became very popular. His other stories include: *Marooner's Island* (1868); *Frank Gordon* (1869); *Woodruff Stories* (1870).

GOUNOD, go͞o′nō′, Charles François (1818–93). A distinguished French composer of sacred and dramatic music. He was born in Paris, June 17, 1818, the son of an eminent painter and engraver, who died in 1823, leaving his widow and family in comparative poverty. In his autobiographical *Memoirs,* published in 1895, Gounod ascribes all his artistic success to the training and influence of his mother, who was a woman of remarkable character as well as an accomplished musician. At 18 he entered the Paris Conservatory, where his masters were Reicha, Halévy, Lesueur, and Paër, and at the end of his first year he won the second Prix de Rome with the cantata *Marie Stuart et Rizzio.* In 1839 he won the Grand Prix de Rome with the cantata *Fernand.* His first appointment was as organist and precentor of the Missions Etrangères, Paris, where for five years little was heard of him until portions of a *Messe Solennelle,* produced at one of Hullah's concerts in London in 1851, attracted general attention. In the same year he made his début as an operatic composer with *Sappho.* Although not a success, the work earned for its composer a solid reputation. *Ulysse* followed in 1852, shortly after his marriage to a daughter of Zimmerman, a professor at the Conservatory. He became superintendent of instruction in singing to the communal schools of Paris, and also director of the choral society connected with them, succeeding Hubert, the original founder of the society. The experience gained in this employment was of inestimable value to him, in that he learned to direct and utilize large masses of vocal sound so as to develop the mechanism of sonority, under very simple methods of treatment. *La nonne sanglante,* an opera in five acts, written in 1852, presented in 1854, and performed only eight times, was his next work, its failure proving a great disappointment to him. In 1856 he made the acquaintance of Barbier and Carré, who agreed to supply the libretto of *Faust;* but by the time it was half finished a difficulty arose which precluded an immediate presentation, and Carvalho, who was to stage the new opera, asked that instead Gounod would write a comic opera, taking the subject from Molière. *Le médecin malgré lui* (1858) was accordingly written, its success being immediate and complete. A melodrama, *Faust,* had meanwhile been given at a rival theatre with but little success, and the collaborators returned to their work on their own half-finished opera of *Faust,* which was produced March 19, 1859. It did not meet with immediate approval, but has subsequently come to be regarded as the composer's operatic masterpiece and still holds its place as one of the most popular operas. *Roméo et Juliette* (1867) is, however, regarded by French critical opinion as of greater musical value than *Faust.* Smaller and less successful compositions were the following: *Philémon et Baucis* (1860); *La Colombe* (1866); *La reine de Saba* (1862); *Mireille* (1864). His sojourn in England during the Franco-German War was as profitable to him as it was beneficial to the cause of music in England. He formed the Gounod Choir, a choral society of mixed voices, which gave very successful concerts. To this period belong *Gallia,* a small cantata of enduring merit, and the *entr'acte* music to several stage productions. His great oratorios, *The Redemption* (1882) and *Mors et Vita* (1885), are standard. Of his five masses the most beautiful and famous is the St. Cecilia (1882). In 1896 his *Mémoires d'un artiste* (which end with the year 1859) appeared posthumously. The most comprehensive biography is that by J. G. Prod'homme, *Gounod: Sa vie et ses œuvres* (2 vols., Paris, 1911). Consult also: H. Tolhurst, *Gounod* (New York, 1904); P. L. Hillemacher, *Gounod* (Paris, 1905); H. Imbert, *Charles Gounod* (ib., 1907); C. Bellaigue, *Gounod* (ib., 1910).

GOUPIL, Adolphe (1806–93). The founder of the famous French art firm of Goupil et Cie. (now Manzi, Joyant et Cie.). He started in Paris in 1827 as a dealer in copperplate engravings, but before long acquired a plant and began to publish prints as well as sell them. Among the many French artists whose paintings were reproduced are Delaroche and Ary Scheffer. Later the processes of photogravure and of color printing were added, and the principal pictures of each year's Salon were thus multiplied. Illustrated works, books of patterns, and study sheets for painters and designers were also published. The firm has branches in New York, Berlin, and The Hague.

GOUR. See Gaur.

GOURA, go͞o′rȧ (Neo-Lat., from the native name). A genus of remarkable fruit-eating pigeons, by far the largest of the family, and natives of Java, New Guinea, and other islands of the Indian Archipelago. The best known (*Goura coronata*) is 2 feet 4 inches in length and is a very beautiful bird, of a grayish-blue color, with parts of the back and wings black and purplish brown and with a broad white bar across the wings. The head is adorned with a large semicircular crest of narrow straight silky feathers, always carried erect. Gouras are in the highest esteem for the table, but attempts to introduce them into the poultry yards of Holland have completely failed. Seven or eight forms are known. They have become rare on account of continued persecution, their crests being much in demand by milliners. See Plate of PIGEONS.

GOURAMI, go͞o′rȧ-mĭ (Javanese name). An excellent fish (*Osphromenus olfax*), native in the rivers and brackish waters of China and the East Indian Archipelago, which has a deep oval, compressed body, large scales, and long dorsal and anal fins. The first ray of the ventral fins is prolonged backward as a long filament. The fish grows 3 to 5 feet long, though the usual size averages below this, and is greenish brown obscurely banded with vertical stripes. It is one of the nest-building fishes and at the breeding season forms its nest by entangling the stems and leaves of aquatic grasses. Both the male and female watch the nest for a month or more with careful vigilance and violently drive away every other fish which approaches, till the spawn is hatched, afterward affording a similar parental protection to the young fry.

This fish is usually regarded as the best table fish of Eastern waters and has been artificially cultivated for a long period in tanks, etc., by the Malays and Dutch of the East Indies. It is hardy and omnivorous and was long ago carried to India, Mauritius, Australia, and even to the French West Indies, thriving well in all these places and multiplying in the local streams.

GOURD, gōrd *or* go͞ord (Fr. *gourde*, Portug. *cougourdo*, It. *cucuzza*, from Lat. *cucurbita*, gourd). The name "gourd," or its equivalent, as employed in Europe includes squashes and pumpkins, but in America it is confined largely to the inedible hard-shelled fruits of certain members of the family Cucurbitaceæ. The more common American gourds are *Lagenaria vulgaris* and some small egg and pear shaped ornamental fruits belonging to *Cucurbita pepo*, var. *ovifera*. The former is a rampant climbing vine, which finds considerable use as a cover for unsightly places. On account of their shapes the fruits are frequently used for dippers, bottles, or dishes, after their contents have been removed and they have been soaked to get rid of the bitter principle. The Luffa (vegetable sponge), or dishcloth gourd (*Luffa cylindrica*), has recently come into prominence in America. The young fruit is edible and the fibrous interior of the dried fruit, when properly prepared, is used as a bath sponge. It also makes a durable dishcloth. These and smaller ornamental gourds are all of the easiest culture, requiring about the same treatment as do squashes. See BOTTLE GOURD; CALABASH GOURD; CUCUMBER. See Plate of CUCUMBER ALLIES.

GOURD FAMILY. See CUCURBITACEÆ.

GOURD′SEED. A local name in the Western United States for the Missouri or black-horse sucker (*Cycleptus elongatus*). See SUCKER, BLACK HORSE.

GOURGAUD, go͞or′gō′, GASPARD, BARON (1783–1852). A French general, born at Versailles. After serving with distinction in the various campaigns of Napoleon from 1805 until 1813, he was appointed his adjutant general and later given the title of Baron. He accompanied Napoleon to St. Helena, but was compelled for political reasons to leave the island in 1818, after he had assisted Napoleon in preparing his *Mémoires*. In 1832 he became aid-de-camp to Louis Philippe and in 1841 was appointed to the House of Peers. His principal publications are: *La campagne de 1815* (1818); *Mémoires pour servir à l'histoire de France sous Napoléon, écrits à Sainte Hélène sous la dictée de l'empereur* (8 vols., 1822–24); *Réfutation de la vie de Napoléon par Sir Walter Scott* (2 vols., 1827); *Journal de Ste. Hélène* (1899).

GOURGUES, go͞org, DOMINIQUE DE (1530–93). A French soldier and adventurer, born in Mont-de-Marsan, Gascony. In his youth he served in Italy with the French armies under Maréchal de Strozzi and in 1557 was captured by the Spanish at Siena. He was condemned to the galleys, where he was still serving, two years later, when his ship was captured by the Turks. The change of masters brought no immediate relief, and he was still kept at the oar, until the vessel fell in turn into the hands of the Knights of Malta, by whom he was set at liberty. His rough life had bred in him a love of adventure, and in the next few years voyages to Africa, to Brazil, and other far-off regions increased his experience and won for him renown as a leader of men and a sailor. He returned to France at a time when the blood of all Frenchmen and of French Huguenots in particular was stirred by the report that the year before (1565), although France and Spain were at peace, Menendez (q.v.) and a Spanish force had descended upon the French Huguenot settlement of Jean Ribault at Fort Caroline on the Florida coast, had massacred the greater part of the colonists, and had afterward hung a large body of Ribault's followers under a placard, which read, "Not as to Frenchmen, but as to Heretics." Gourgues planned to wreak vengeance with his own hands. He sold his family estate, borrowed all the money he could, and fitted out three small ships, manned with 80 sailors and 150 arquebusiers, for the ostensible purpose of kidnaping negroes in Africa. Sailing in August, 1567, to the coast of Benin (Africa), he secured a cargo of negroes with which he sailed across the Atlantic, and which he sold to the Spaniards in the West Indies. He landed near the mouth of the St. John's River, on which Fort San Mateo stood, and found willing allies in Chief Satouriona and his tribe of Indians, who had suffered much at the hands of Menendez. Gourgues and his allies descended at once on the two small forts which the Spanish had built at the entrance of the St. John's, and after destroying their garrisons attacked Fort San Mateo itself the next day. Such of the Spaniards as had not been killed in the assault were hung on the very trees upon which they had hung their captors' fellow countrymen, and over their heads was placed a pine board, whereon was written, "Not as to Spaniards, but as to Traitors, Robbers, and Murderers." The fortifications were razed, and Gourgues set sail for France, arriving at La Rochelle on June 8, 1568, where he was received with honor and rejoicing. He is probably the author of *Reprise de la Floride,* the best edition of which is by Tamizey de Larroque (Paris, 1857). Consult: Basanier, *L'Histoire notable de la Floride* (Paris, 1586), which was translated and published by Hakluyt (London, 1587) as *Notable History* and reprinted in French's *Historical Collections of Louisiana and Florida* (New York, 1869); also Parkman, *Pioneers of France in the New World* (Boston, 1903); Gaffarel, *Histoire de la Floride française* (Paris, 1876).

GOURKO, g͞oor′kō, Ossip Vladimirovitch. See Gurko.

GOUR′LAY, Robert Fleming (1784–1863). A Canadian statistician and political reformer, born in Fifeshire, Scotland. He devoted much study to statistics and economic subjects, and on the basis of his report on the condition of the British poor a measure passed the House of Commons, but was rejected by the Lords. In 1817 he came to Upper Canada, where the political dominance of the Family Compact and the ecclesiastical privileges of the Anglican church had caused widespread discontent. (See Canada, *History;* Political Parties, *Canada.*) Gourlay, who sided with the popular party, called a convention through which to present the public grievances before the British government. This made him a marked man. When tried for sedition, at Kingston and at Brockville, he was acquitted, but ordered to leave Upper Canada. He refused, and in 1819 was imprisoned in the jail at Niagara, where he remained so long and under such privation that his health was seriously injured. He was found guilty of disobeying the order of banishment, was compelled to quit the country, and, after residing for some time in the United States, went to England. In 1836 the sentence against him was nullified, his imprisonment declared illegal, and he was granted a pension, which he declined. He came again to Canada, but eventually went to reside in Edinburgh, where he died. He wrote a number of able political pamphlets, but his most important work was a *Statistical Account of Upper Canada* (1822).

GOURMONT, g͞oor′môn′, Rémy de (1858–1915). A French scholar, born at Bazoches-en-Houlme (Orne). In 1883 he obtained a position at the Bibliothèque Nationale, but lost it (1891) on account of a radical article which displeased the government, *Le joujou: patriotisme* (The Plaything: Patriotism). A profound scholar and an aristocrat by temperament, he was strangely won over to the blunt naturalism of his friend Huysmans and the symbolism of Gérard de Nerval and Mallarmé, whose contentions he continued to uphold, especially in matters of literary style. His unimpeachable sincerity and distrust of second-hand information, together with a constant contact with modern French writers of the most advanced schools, make him, if not always an impartial critic, at least a frequently reliable authority on the literature of the day. In this respect he is second only to Anatole France (q.v.). He came to be at the head of a most important periodical, *Le Mercure de France.* Of his many publications, the following are the most typical: *Le Français au Canada* (1888); *Prose moroses* (1896); *Le pèlerin du silence* (1896), which contains one of the gems of French symbolist prose poetry; *Le livre des masques* (1896–98); *Promenades littéraires* (1904–06) and *Promenades philosophiques* (1906–08), which contain a comprehensive view of the latest products in their respective fields; *Des divertissements* (1912), a volume of poetry. Consult: P. de Querlon, *Rémy de Gourmont* (Paris, 1903); J. Huneker, *The Pathos of Distance* (New York, 1913); A. Ransome, *Portraits and Speculations* (London, 1913).

GOURNAY, g͞oor′nā′, Jacques Claude Marie Vincent de (1712–59). A French administrator and political economist, born at Saint-Malo. He was the son of a wholesale merchant, and at an early age became a partner in a mercantile firm established in Cadiz. As a representative of the firm, he traveled extensively in Spain, Germany, England, and Holland, and acquired a wide knowledge of commercial practice and policy. In 1751 he purchased the administrative post of Inspector of Trade in Paris, from which he retired in 1758. Gournay was a man of inquiring turn of mind and early became convinced of the irrationality of the restrictive commercial policy then pursued by France. Familiar with the writings of the liberal mercantilists of England and Holland, he sought to popularize their work in France. He exercised a considerable influence over a group of ambitious young men in the civil service, of whom Turgot (q.v.) later rose to distinction. Although the popularization of the phrase, "Laissez faire, laissez passer," was attributed to Gournay by the later Physiocrats, he was far from an acceptance of the absolute free-trade ideas of the Physiocratic school. He is properly to be regarded as a moderate protectionist, with interest directed towards the development of industry rather than of agriculture. His influence upon the development of economic doctrine, which was considerable, was exerted chiefly through oral tradition. His writings are scant and of no especial importance.

GOURNIA, g͞oor′nĭ-ȧ. A town in the eastern part of Crete, 60 miles east of Candia, in a valley leading to a sheltered bay on the northern coast. The name, derived from the shape of the valley, signifies "trough" or "basin." Though not mentioned in ancient writers, this town was long an important centre of Minoan civilization. Later, about 1500, it was completely destroyed. Excavations were conducted on its site in 1901, 1903, 1904, by Mrs. Harriet Boyd Hawes (Miss Harriet A. Boyd). At the top of the hill on which the town lay, where the rock had been largely denuded, many of the best objects in bronze and terra cotta were found within 2 feet of the surface; lower down the hill the town had been buried to a depth of 15 feet or more. The culture represented at Gournia dates in the main from 1700 to 1500 b.c., though many of the objects found belong to much earlier times. The ground plan of houses can be clearly made out; indeed, upper walls of fire-baked brick resting on stone bases and traces of staircases have been found. Paved roads, too, were laid bare; so also a market place. In the houses was found "much the most varied and comprehensive apparatus of Minoan domestic economy available for study, and nowhere else is better revealed what high artistic aim and achievement went with restricted provincial means in that remote age." See Crete, *History;* Archæology, I, *The Pre-Mycenæan or Minoan Period,* and, II, *Mycenæan Period.* Consult: Burrows, *The*

Discoveries in Crete (London, 1907); C. H. Hawes and H. B. Hawes, *Crete, the Forerunner of Greece*, especially 88–102 (London, 1909), with plan; H. B. Hawes and others, *Gournia, Vasiliki, and other Prehistoric Sites on the Isthmus of Hierapetra, Crete* (Philadelphia, 1908), a richly illustrated work.

GOUROFF, go͞o'rôf', real name Jardy Dugour (1766–1840). A Franco-Russian author. He was born at Clermont-Ferrand, of Russian extraction. After acting as director of the Collège de la Flèche until the outbreak of the Revolution, he went to Russia, where he adopted the name of Gouroff, and successively became professor at Kharkov and St. Petersburg. His literary productions include: *Mémoire justificatif pour Louis XVI* (1792–93); *Mémoires sur les Tatares Nogaïs* (1816); *De l'influence des lumières sur la condition des peuples* (1826); and *Essai sur l'histoire des enfants trouvés depuis les temps les plus anciens jusqu'à nos jours*, an interesting work later embodied in the publication entitled *Recherches sur les enfants trouvés, etc.* (1829), which contains statistics on illegitimacy in Europe, Asia, and America.

GOURSAT, go͞or'sä', Edouard Jean Baptiste (1858–). A French mathematician, born at Lanzac, Lot, France, and educated at the Collège de Brive, the Lycée Henri IV, and the Ecole Normale Supérieure. He was instructor in the faculty of science, Paris (1879–81) and Toulouse (1881–85); from 1885 to 1889 was chief lecturer in mathematics at the Ecole Normale Supérieure; and became in 1896 a tutor at the Ecole Polytechnique and in 1897 professor of differential and integral calculus at the Sorbonne. He obtained the grand prize of mathematical science in 1886, the Poncelet prize in 1889, and the Petit d'Ormoy prize in 1891. He also became a Chevalier of the Legion of Honor and an officer of public instruction. His works include: *Leçons sur l'intégration des équations aux dérivées partielles du premier ordre* (1891; Ger. trans. by Maser, 1893); *Leçons sur l'intégration des équations aux dérivées partielles du second ordre à deux variables indépendantes* (2 vols., 1896–98); *Théorie des fonctions algébriques et de leurs intégrales*, with Appell (1895); *Cours d'analyse mathématique* (2 vols., 1902–05; 2d ed., 3 vols., 1910–13; Eng. trans. of vol. i by E. R. Hedrick, 1905); "Equations non linéaires du premier ordre" in *Encyclopédie des sciences mathématiques* (1913).

GOURVILLE, go͞or'vēl', Jean Hérault de (1625–1703). A French political agent and adventurer, born at La Rochefoucauld. He entered the service of the Abbé de la Rochefoucauld, went to Paris with him, and there became secretary to the Prince de Marsillac (1646). From that time he was deep in all the political intrigues of the day, sometimes being in the pay of both sides. During the wars of the Fronde he attached himself particularly to Condé. By various means he had enriched himself considerably, so that when condemned to lose his fortune through confiscation after the fall of Fouquet, he escaped to England, and finally settled in Brussels. In 1667 he was able to be of service to France at the Congress of Breda, and afterward was employed in political missions until he obtained the official pardon necessary before he could return to court in 1690. The last years of his life were spent in the best literary society of the time. He left some *Mémoires* (2 vols., 1894–95).

GOUT (from OF. *goute, goutte*, It. *gotta*, drop, gout, from Lat. *gutta*, drop); Podagra. A term first used by Radalphus in the thirteenth century, who taught that gout was caused by a humor that flowed drop by drop into the joints. The numerous references to the disorder, not only in the medical writings of Hippocrates, Galen, Aretæus, Cælius, Aurelianus, and the later Greek physicians, but in such purely literary works as those of Lucian, Seneca, Ovid, and Pliny, show not only the frequency, but the notoriety of the disease. It is caricatured by Lucian in his burlesque of *Tragopodagra* in language quite applicable to the disease as now observed; while the connection of it with the advance of luxury in Rome is recognized by Seneca in the remark that in his day even the women had become gouty, thus setting at naught the authority of physicians, who had asserted the slight liability of women to gout. Pliny likewise remarks upon the increase of gout, even within his own time. Ovid and Lucian represent the disease as mostly incurable by medicine; from this view Pliny dissents. The list of quack remedies given by Lucian is one of the most curious relics of antiquity. Gout is both a local disorder and a general perversion of nutrition. Consequent upon imperfect oxidation, there is found an excessive formation of uric acid, fats, and fatty acids, instead of water, carbonic acid, and urea. Sometimes there is an excess of unoxidized sugar. The disease is a special manifestation of a tendency called the arthritic diathesis. (See Diathesis.) Baldness, pityriasis, acne, eczema, urticaria, prurigo, asthma, catarrhal inflammations of the mucous membranes, varicose veins, hemorrhoids, and neuralgia are often resultants of the same perversion of nutrition that in some cases manifests itself as gout. Iritis and irido-choroiditis are the most common of the gouty inflammations of the eye. The external and middle ear, too, suffer from gout. Biliary lithiasis, visceral calculi, diabetes, obesity, hemicrania, and arthritis deformans are among the morbid affinities of gout. The malady is to some extent hereditary; and in some gouty families functional nervous diseases are very common among the descendants (especially the females) of gouty ancestors. But diet and mode of life are far more potent factors than heredity in its causation. Some families ascribe to heredity diseases that are actually due to living under the same faulty conditions of hygiene and dietetics, whereby a morbid predisposition becomes established. Gout has disappeared from many localities in Europe step by step with the growth of temperance and the acquisition of hygienic knowledge.

Acute gout, however, followed by uratic deposits in the joints, is frequently transmitted in families. It is almost always a disease of adult age. Women are far less liable to acute gout than men. The character of food largely determines the amount of urea and uric acid produced in the body, and nitrogenous food is provocative of gout. Active muscular exercise and avoidance of grief or anger, or disturbance of psychic balance, are valuable preventives of attacks, even in those who inherit the gouty tendency. Change of season favors gouty outbreaks, the spring and autumn furnishing a large proportion of cases. Climate is a determining, though not decisive, cause. The free perspiration induced in warm countries is a safeguard against gout. Workers in lead, plumbers, painters, enamelers, and tinners are especially liable to be attacked by gout, various observers finding lead poisoning a factor in from 15 (Osler) to 33 per cent of cases.

Pathologically, gout is characterized by the presence of an excessive amount of uric acid in the blood and the deposition of uric-acid salts in the tissues. The most common seat of deposits is the articular cartilage of the first joint of the great toe, but other articular cartilages may also be involved, as may also the cartilages of the eyelids, larynx, and ears, and the ligaments of joints. The deposit incrusts or infiltrates the cartilage, and if ulceration of the overlying skin takes places, may appear on the surface as the so-called "chalkstones." According to Ebstein, the primary changes in the joints are those of a local necrosis due to the excess of urates in the blood. Sclerotic conditions in the arteries and kidneys are quite common, and deposits of urates in the latter may occur. Hypertrophy of the heart is often associated with the arterial changes. As to the cause of the accumulation of urates in the system in gout we are uncertain. It may be due to defective elimination of urates or to local conditions which favor their deposition. A typical attack of acute gout presents the following symptoms: After some weeks of previous indigestion, attended with flatulent swelling and a feeling of weight, the patient goes to bed free from pain, and having had rather an unnaturally strong appetite the day before. In the middle of the night he is awakened by a pain in the great toe, or sometimes in the heel, the ankle, or the calf of the leg. The pain resembles that of a dislocated bone, and is accompanied by a sense as if water not perfectly cold were poured over the affected limb; to this succeeds chilliness, with shivering and slight fever, these last symptoms diminishing as the pain increases. From hour to hour, until the next evening, the patient suffers every variety of torture in every separate joint of the affected limb; the pain being of a tearing, or crushing, or gnawing character, the tenderness such that even the weight of the bedclothes, or the shaking of the room from a person's walking about in it, is unbearable. The next night is one of tossing and turning, the uneasy limb being constantly moved about to find a better position; till towards morning the victim feels sudden relief, and falls over into a sleep, from which he wakes refreshed, to find the limb swollen, the venous distention usually present in the early stage having been succeeded by a more general form of swelling, often with itching between the toes, and a peeling off of the cuticle. This individual attack may be repeated many times in the course of what is termed "a fit of the gout," which commonly extends over a period of weeks, or even months, before the patient is completely relieved; or the attacks may occur in both limbs, or in several other parts of the body in succession, the real termination of the "fit" being at last indicated by an apparently complete restoration of health, and even, in some cases, by a period of improved condition and capacity for exertion, as compared with the state of the patient before the attack. In this form, acute gout might almost be called a local disease; although the connection of the attacks with deranged digestion, or with the other morbid affinities already described, and the obvious relief obtained after a sharp attack, from the symptoms of constitutional suffering, point to a cause of the disease operating over a larger range of functions than those included in the local manifestations at this period.

The joints which have been repeatedly the seat of the regular paroxysm become more or less permanently crippled and distorted. The patient is laid up more or less permanently; and exercise, the great natural specific remedy of the gouty, is rendered impossible. Then follow aggravations of all the constitutional troubles. Indigestion continues or becomes constant, assuming the form chiefly of acidity after meals; the liver becomes torpid, the abdomen corpulent, the bowels constipated; the kidneys fail to perform their functions satisfactorily, and not infrequently there is a tendency to gravel and calculus (q.v.); the heart is affected with palpitations, or fainting occurs, sometimes with spasmodic attacks of pain; the arteries become the seat of calcareous deposits, and the veins are varicose in the limbs and in the neighborhood of the rectum (see PILES); the temper is singularly irritable, and often morose; sooner or later the appetite fails or is only kept up by very stimulating and unwholesome diet, with an excess of wine or of alcoholic liquors; in the end, the body emaciates, and premature old age supervenes. Sometimes the end is sudden, as by cerebral hemorrhage, uræmia, dropsy from the heart condition, or gouty kidney (interstitial nephritis). Uric acid in a certain excess has been shown by Garrod, and subsequently by Alexander Haig, to be characteristic of the blood of the gouty, although a minute amount of this substance is probably present even in perfect health. The most recent speculations, accordingly, tend to connect the gouty predisposition either with an excessive formation or a checked excretion of this important substance, the product of the vital distintegration of flesh and other food, after these have subserved the wants of the system. The cure of gout demands the careful consideration of all its predisposing causes in the individual, and the strict regulation of the whole life and habits accordingly, from the earliest possible period. The amount of meat food and sugar must be lessened, and milk and vegetables must constitute the diet. In old people, fruit acids should be avoided, wine and malt liquors absolutely prohibited, and large quantities of pure water imbibed. In some cases very small quantities of distilled spirits do not harm a patient who is taking no nitrogenous food but milk. Tea, coffee, and cocoa are forbidden.

Exercise in the open air facilitates interstitial oxidation, and improves excretion. Mountain climbing benefits many. Cold sponge baths, with brisk friction from a rough towel thereafter, are desirable, unless reaction be feeble. In the latter case warm baths are indicated. The bath should be taken in the morning and the patient should return to bed for an hour at least. For certain patients dry, hot-air baths, Turkish or Russian baths are desirable; to others, sea baths are beneficial.

Medicinal treatment consists in the intelligent use of alkalies, salicylates, and benzoates, mineral acids, purgatives, mineral waters, colchicum, lithium salts, piperazine, mercurials, iodides, quinine, antipyrin, guaiac, and certain other drugs. There is no routine treatment for the disease; the patient must be studied and treated according to the nature of the case.

Consult Haig, *Uric Acid in the Causation of Disease* (London, 1894); and article by Futcher in Osler's *Modern Medicine* (2d ed., New York, 1914).

GOUTHIÈRE, gōō'tyâr', Pierre (1740–1806). A French worker in metals and minerals, born at Troyes, France. He studied under Martin Cour. He executed a great many pieces of metal work, principally for the Duc d'Aumont, the Duchesse de Mazarin, and Madame du Barry. At the Duc d'Aumont's auction in 1782 more than 50 pieces of Gouthière's work, including chandeliers, candelabra, porphyry vases, lacquer cabinets, jaspers, marbles, and porcelains mounted in bronze, were sold. Marie Antoinette paid 12,000 livres for a red jasper bowl that was in the collection. Gouthière, who had spared no effort in embellishing the château of Madame du Barry, was ruined when she was guillotined—she owed him 756,000 livres. The red jasper bowl and many of the finest specimens of Gouthière's art are to be found in the Wallace collection, London.

GOUVERNEUR, gŭv'ẽr-nōōr'. A village in St. Lawrence Co., N. Y., 36 miles by rail south of Ogdensburg, on the Oswegatchie River, and on the New York Central and Hudson River Railroad (Map: New York, E 2). It has extensive marble, dairying, and wood-pulp interests, iron mines, talc mines and mills, and other manufactures. These are facilitated by abundant water power. There is a public library, and the water works are owned by the municipality. Pop., 1900, 3689; 1910, 4128.

GOUVION, gōō'vyôɴ', Laurent, Marquis de Saint-Cyr. See Saint-Cyr.

GOUVY, gōō'vē, Théodore Louis (1822–98). A German pianist and composer, born at Goffontaine, near Saarbrücken, in Rhenish Prussia. At the age of 21 he was a student of law in Paris, but abandoned that profession for music. For three years he was a private pupil in counterpoint of the celebrated Elwart (q.v.). After further study in Berlin and Rome, he returned in 1846 to Paris, and gave his first concert under very successful auspices one year later. The programme consisted of his own compositions. He was throughout his life a popular teacher in both France and Germany. In the former country he was made Chevalier of the Legion of Honor in 1886. His works include: *Missa Brevis*, for solo, chorus, and orchestra; *Frühlings Erwachen*, for soprano solo, male chorus, and orchestra; a *Requiem High Mass; Golgotha*, a sacred cantata; several dramatic cantatas, and numerous smaller vocal and instrumental pieces. His compositions, which had a considerable vogue, contain many elements of permanency, and are characterized throughout by a melodious blending of solid German and graceful French harmonic construction. He died at Leipzig. Consult O. Klauwell, *Th. Gouvy* (Leipzig, 1902).

GOVAN, gŭv'an. A burgh in Lanarkshire, Scotland, on the left bank of the Clyde. Its prosperity depends upon Glasgow, which has embraced it within its natural boundaries. It contains large shipbuilding yards, engineering works, foundries, and other industrial establishments. Pop., 1901, 76,351; 1911, 89,725. In the sixteenth century this ancient village was one of the largest in Scotland, and down to the middle of the seventeenth century bore the name of "Meikle Govane."

GOV'ERNMENT (OF. *government, gouvernement*, Fr. *gouvernement*, from Lat. *gubernare*, to govern, steer, from Gk. κυβερνᾶν, *kybernan*, to steer). In the most general sense, any orderly arrangement and management of affairs, especially in human society. It is in this sense that we employ the term, in such widely related expressions as the divine government, household government, and the like. Specifically the term is most commonly used as a condensed expression for political government, or the authoritative regulation of the affairs of a political community or state. Though often confused with the state itself, government is more properly conceived of as the external political organization of the state, as the mode in which, and the agencies by which, the state puts forth its energies. A state may thus completely change its political organization without losing its political identity, as the French nation has in little more than a century passed through all the phases of government from absolute monarchy to republican democracy, without a change in its essential character and unity as a state. Indeed, we may conceive of a state as existing without any government, the authority of the latter in the preservation of order and the enforcement of obligations being supplied by mutual coöperation and good will on the part of the citizens. It is at the realization of such a state, and not at the dissolution of all civic and social relations, that the philosophic anarchism of the present day is aimed. The imaginary "state of nature," pictured by Rousseau and other writers of the eighteenth century, involves, on the other hand, the complete negation of the state, i.e., of all civic relations, as well as of government. It does not seem likely that humanity will ever be able to dispense with either. With the growing complexity of human affairs, the necessity for the organization of society in political communities grows ever greater, and there are no indications of the disappearance of those predatory instincts of human nature upon which the necessity for organized government is based.

Nature of Government. Government means authority, and in the last analysis all government rests upon force, i.e., upon the power of constraining the action of any citizen or any number of citizens through the organized agencies of the state. This power may not be wisely or uniformly exercised; it may even, in the case of the modern industrial state, seldom or never be openly exerted; but no government can exist without it, and a government is partial and incomplete, or perfect and complete, in proportion as it is able to command this power. The mere fact that the governing authorities of a state tolerate certain forms of injustice, or refuse or neglect to enforce certain laws, does not detract from the completeness of the government, so long as it has in reserve the power to compel obedience to its decrees. But a government may be one of limited powers, not because of any inherent lack of force, but because its authority is restricted by its constitution to a limited class of matters. Such limitation may be voluntary, as is the case in the United States and the self-governing colonies of Great Britain, where governmental power is distributed between the several States and the central government, or it may be imposed upon a state by the action of a paramount state, as is the case with Cuba under the recent convention with the United States. In much the same sense, we may speak of the government of minor political divisions of a state, as of cities, towns, and counties, as a government of limited powers. Within the sphere of their chartered authority, these may have ample governmental powers, but the scope of that authority and the field of its exercise are strictly limited by the grant or charter conferring it.

The two most striking facts in connection with political government are, first, its universality, and, second, the variety of forms in which it has manifested itself. It has existed in all stages of human society and, in at least a rudimentary form, in every considerable group of men and women united, however loosely, in a political community. This universality of its occurrence testifies to its necessity, and probably to its permanence as an institution of human society. Of all human institutions, it has proved to be the most enduring, and, with the exception of the family, probably the most important and influential in shaping the destiny of mankind. Men have found it possible—as in China to-day—to live without an organization of religion, and, as in Sparta and among many barbarous tribes, without the institution of the family as we understand it; but wherever men and women live in society, some form of government arises to regulate their relations to one another and to other communities.

But, although government is the oldest, the most persistent, and the most widespread of human institutions, there is no normal or absolute type of political organization. We may trace its origin to the institution of the patriarchal family, but the patriarchal type of government is limited to society in its primitive stages, and in small aggregations. Men have sought for an ideal or absolute type in their conception of the divine government, and for centuries the glamour of the later Roman Empire cast its spell over Europe, and successive generations of statesmen and political philosophers endeavored to recast the governments of Europe into a Holy Roman Empire; the seventeenth century brought to its culmination the mediæval theory of the divine right of kings, and the eighteenth resolved all political authority into a social compact (*contrat social*) among the members of the state. But no one type of government has emerged, either in fact or in theory, out of all this speculation. Governments are as diverse as ever, and we have come to recognize this diversity as a proof of their excellence and not as a defect. It is a part of the accepted philosophy of our time that a government should in its spirit and its form express the political consciousness and aims of the community, and that that government is best which most accurately reflects the character, the interests, and the purpose of the state. See SOCIETY; SOCIOLOGY; STATE.

Forms of Government. In respect of its nature a government may be either autocratic, as wherever the essential power of the state is, under whatever form, directed by an individual or by a select class of persons constituting a minority of the state; or it may be popular, as where the substantial power is vested in the entire body of persons constituting the state. The old classification of governments into monarchies or tyrannies, aristocracies or oligarchies, and democracies, which we owe to Aristotle, is defective in that it confuses the external form with the essential character of the government. It presupposes a simplicity of organization, and a correspondence between the form of the government and the actual seat of power, which are not often realized outside of the ideal commonwealth. There is, it is true, a form of political organization which is peculiarly appropriate to every kind of government. Under such an ideal arrangement, a tyrant would always be a king or emperor; an oligarchy would dispense with the trappings of royalty and with the fiction of republican forms; and popular government would always appear in the proper guise of a republic. But in practice the matter is by no means so simple. Old forms of government remain long after the balance of power and the actual seat of authority have been shifted and transferred, or a popular form may be deliberately adopted to veil an unpopular exercise of authority. The republican form of government survived in Rome for centuries after the assumption of power by the emperors had become complete. The government of Mexico, like that of most of the Spanish-American republics, is a scarcely disguised autocracy. The same was true of the consulate of the first Napoleon, while the government which bears the name of King George V of England is one of the best existing examples of a government of the popular or democratic type.

The monarchical form of government is still the prevalent form, covering as it does substantially the whole of Europe, Asia, and Africa, and half of North America. These royal governments may be divided into two groups—those in which the royal power has been wholly or partially transferred to the body of the people, known as limited monarchies; and those in which the autocratic principle remains substantially unimpaired. The more usual type of autocracy is an oligarchy, more or less thinly disguised under the forms of monarchy. In such states it is not an individual, but a caste, a ruling class, which actually directs the energies of the state. This caste may be hereditary, as in Japan, in which case we call it an aristocracy; or it may be tribal, or racial, like the Manchu oligarchy which until recently swayed the destinies of the vast Chinese Empire, and the castes which formerly dominated the native states of India; or it may be merely bureaucratic, a compact guild of officeholders, such as that which, under the influence of Russian traditions, directs the policy of the Czar. This continued prevalence of the monarchical form of government is one of the surprises of recent political history. To the observers of half a century ago it seemed as though the democratic movement which swept over Europe at that time was destined to destroy all the ancient thrones, and set up self-governing republics in their stead. But such observers forgot that royalty might continue, though shorn of much of its power, and that the people might rule through the forms of monarchy. Accordingly every government in Europe, with the exception of Russia and Turkey, has become largely popular in substance, if not in form. See ARISTOCRACY; DEMOCRACY; MONARCHY; OLIGARCHY.

Complex Varieties of Government. Thus far the government of states has been dealt with as though each were a unit, animated by a single political principle. But the matter of civil government is far too complex to be covered by a single formula. Each state is the theatre of different, and often conflicting, political experiments. There is always a central government, sometimes strong, and sometimes so weak that it can scarcely hold together; and in either case there is usually a considerable organization of local governments—of towns, parishes, boroughs, communes, and the like—largely independent of the central government, and often organized on diametrically different principles. We are not surprised to find a considerable development of local self-government in the towns and parishes of England and the United States; but that a democratic system of local self-government should have existed in Russia long before the promulgation of a constitution, and that the communal governments of France should be strictly controlled from Paris, would hardly be expected from the nature of the central government. The inconsistency is explained by the fact that the local governments, which touch the average citizen most nearly and by which all of the ordinary affairs of life are regulated, are seldom created by the central government, but in most instances had been fully developed before the latter came into being, and not only is the hamlet or village government usually much older than the general government of the state, much older, indeed, than the state itself, but it is also much more enduring, much more tenacious of life, and, upon the whole, much more important to the state than the central government. The latter may be a usurpation, or the accidental result of a war; it may change with the death of a ruler or the end of a dynasty, without affecting the internal structure of the state or the organization of society. But the local government is the slow growth of time, interwoven with the habits and compounded of the customs of the community; it is never foreign, never alien; while it lasts the state endures, and when it is dissolved the social foundations of the state are disintegrated.

Other elements of complexity result from the union of different states in one political organization, or under one sovereign, or from the administration by one state of a variety of colonies or dependencies. The first of these is the federation, or federal state, of which the United States of America, the Dominion of Canada, the Australian Commonwealth, and the German Empire are the leading examples. Akin to this is the union of England, Scotland, and Ireland in the Kingdom of Great Britain. The union of two or more states under a common ruler, but without becoming one nation, is illustrated by the ephemeral political leagues of ancient Greece, by the German Confederation of 1867, by Austria-Hungary, and until recently by Scandinavia. The British Empire affords the most striking illustration of the union of a great variety of governmental forms under one central authority. The government of Great Britain is a score of different governments rolled into one. In England and the self-governing colonies, it is a democratic kingdom; in Ireland, a parliamentary autocracy limited by constitutional forms; in India, an empire wholly autocratic; in Egypt, a satrapy; and everywhere, in the villages of India, in the commonwealths of Canada and Australia, and in the counties of England, it shelters a variety of local governments which perform their ancient functions under the central authority of the Empire. See FEDERAL GOVERNMENT; GREAT BRITAIN; UNITED STATES.

Modern Innovations in Government. The rise of democracy and the spread of popular government have been referred to above, and are elsewhere described. (See DEMOCRACY.) But one result of this movement remains to be considered —the discovery and wide application of the principle of representation in government. It was the lack of this principle that hampered the development of the republics of antiquity and that forced them to assume the imperialistic form. Expansion under those conditions could mean only imperialism—the extension of the rule of the republic over populations which could not, in the nature of the case, participate in the government. It is to England that we owe the discovery of this principle, and to the United States that we owe the demonstration of its capacity to serve the needs of a great and expanding nation, stretching over a vast continent. But it has not only performed the inestimable service of creating great states on the republican model; it has also furnished means for introducing a measure of popular government into the ancient monarchies of Europe, and thus of satisfying the political aspirations of the democracy of the Old World. Since its introduction in England it has become the accepted model of a popular government wherever such government has been introduced. See CABINET; CONSTITUTION; PARLIAMENT; REPRESENTATION.

Objects of Government. Broadly speaking, the objects of political government are well expressed in the preamble to the Constitution of the United States, to "establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity." That these are the principal objects for which governments exist, and that they are all within the sphere of proper governmental action, are propositions which no one denies. It is in the definition of these general objects that differences of opinion appear. A recent writer of authority has divided the functions of government into two groups—the *constituent functions*, or such as are fundamental and necessary in every organized political society, and the *ministrant functions*, which are undertaken, not of strict necessity, but in order to minister to the general welfare. The former include the defense of the state against foreign aggression, the preservation of the peace, the administration of justice, the definition and punishment of crime, the regulation of the domestic relations and of property rights, and the determination of the political rights and duties of citizens and the status of aliens—all of them purely public functions which could not under prevailing conceptions of social and political well-being be left to be determined by chance or committed to the citizens individually. The ministrant functions, on the other hand, are such as might conceivably be left unperformed or left to private initiative, as the coinage of money, the regulation of trade, the maintenance of highways and of postal and telegraph systems, sanitary regulation, public education, the care of the poor and incapable, and the like. It is in determining the extent to which government should go into this broad field of service to society that political philosophers and statesmen are at odds. The *laissez-faire* school, represented by John Stuart Mill and Herbert Spencer in England and by the "fathers" of the American republic, would confine the functions of government as closely as possible to those of the constituent class; while, at the other extreme, there are many thinkers of advanced socialistic views who favor a great extension of ministrant activity on the part of the government. Though the last quarter century has witnessed a decided reaction from the principles of the *laissez-faire* philosophy, it has as yet produced less marked effects in England and in the United States than on the continent of Europe, and still more in the Dominion of New Zealand. That these enlarged views of the functions of government have not made greater progress in the two most democratic states in existence appears to be due to the large part which the conceptions of individual liberty and private rights play in their political thinking, and to their consequent jealousy of any extension of state action. Even in England and the United States, however, the last decade has witnessed a considerable extension of the field of political action in the direction of social reform and industrial regulation. See Political Science; Socialism.

For the methods of governmental action, see Administrative Law; Civil Administration; Civil Service; Court; Law.

Bibliography. The authorities are numerous. Only the most important can here be given. Aristotle, *Politics* (Jowett's translation); Plato, *Republic* and *Dialogues* (Jowett's translation); Cicero, *On the Commonwealth* and *On the Laws;* Machiavelli, *The Prince* (Morley's translation) and *Discourses on the First Decade of Livy* (Thompson's translation); Locke, *Civil Government;* Hobbes, *Leviathan;* Rousseau, *The Social Contract;* Montesquieu, *The Spirit of Laws;* De Tocqueville, *Democracy in America;* Guizot, *Representative Government;* John Stuart Mill, *Liberty* and *Representative Government; The Federalist;* Woolsey, *Political Science;* Burgess, *Political Science;* Bagehot, *The English Constitution;* Amos, *Law and Custom of the Constitution;* Dicey, *The Law of the Constitution* and *Law and Opinion in England;* Bryce, *The American Commonwealth;* Wilson, *The State;* Mulford, *The Nation;* Jenks, *Law and Politics in the Middle Ages* (New York, 1898); Dunning, *A History of Political Theories* (ib., 1902–05); Gierke, *Political Theories of the Middle Ages,* Maitland's translation (Cambridge, 1900); Wood, *Government and the State* (New York, 1902); Bluntschli, *Theory of the State* (2d ed., Oxford, 1892); Moses, *The Government of the United States* (New York, 1906); Lowell, *The Government of England* (new ed., 2 vols., London, 1912); Poley, *Federal Systems of the United States and the British Empire* (Boston, 1913); Lefroy, *Canada's Federal System* (London, 1913); Beard, *American Government and Politics* (New York, 1914). Consult the authorities under Constitutional Law; International Law; Jurisprudence; Political Science; and the titles referred to above.

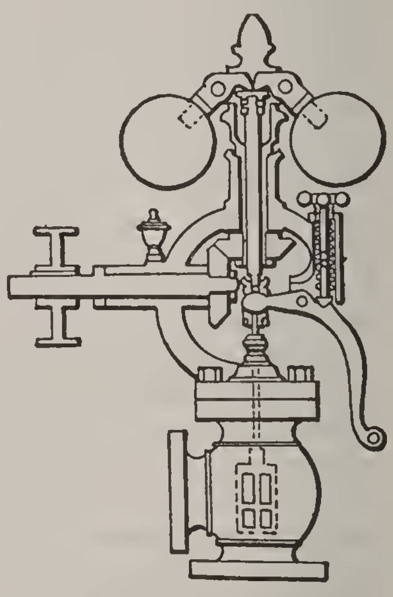
GOVERNMENT, Municipal. See Municipal Government.

GOVERNMENT LAND. In the widest sense, all land within the United States the title to which is not in a State or an individual but in the nation as a whole and, as such, administered by the government at Washington. This includes all land occupied for governmental purposes, as for military or naval posts and stations, public buildings, etc., but the term is popularly used as being synonymous with "public land." In this sense, only such land owned by the national government as is open to sale or occupation under the "Homestead Laws," is included. Land may be acquired by the government for public use under the power of eminent domain, and property thus acquired would be "government land" in the broadest sense, but not as the term is commonly used, as such lands would not be open to public occupation and preëmption. See Eminent Domain; Homestead Laws; Lands, Public.

GOVERNMENT'S ISLAND. See Rock Island.

GOV'ERNOR (OF. *governeor,* Fr. *gouverneur,* It. *governatore,* from Lat. *gubernator,* governor, pilot, from *gubernare,* to pilot, from Gk. *κυβερνᾶν, kybernan,* to steer). The chief executive officer in the States of the American Union. He is elected by the people of the State, and his rights and duties are, in general, those usually associated with the head of the executive department in a republican form of government, namely, the appointment of certain classes of officials, the exercise of the pardoning power and the right of veto, and the command of the State militia. The term of office and the specific limitations on the Governor's powers vary, naturally, from State to State, and will be found under the heading *Government,* in the articles on the different States.

GOVERNOR. A device for controlling the running speed of a steam engine, gas engine, water wheel, or other motor. Governors are made in a variety of forms and with various methods of action. In all, the action is in substance to increase or decrease the supply of the motive power as the speed or the load decreases or increases, and thus to preserve a constant speed. The steam-engine governor, one form of which is shown in the illustration (see Steam Engine), is an excellent example. The balls, which are mounted on a spindle revolved by gearing or belting connected with the main shaft, tend to fly out from the centre by centrifugal force as the speed of the engine is increased. This action can be made to close the valve in the pipe or passage supplying energy, and thus slow down the motor by reducing pressure or quantity. Governors are called isochronous when their action is so sensitive to changes in speed that they tend to keep the engine at a uniform speed under all variations of load or resistance. A governor is practically isochronous when the variation is not allowed to be more than 2 per cent on either side of the desired mean speed. The higher the speed the closer the regulation possible. Governors may act on the supply valve or throttle valve, or on the valve gearing which distributes the steam to the two ends of the working piston. Governors may act to apply a brake on the mechanism, as in some chronographs or in the mechanism of celestial telescopes. Disengagement governors are those which are out of gear at normal speeds, but come into action to turn power off or on as the speeds exceed or fall below such desired normal speed. See Shaft Governor; Internal-Combustion Engines; Water Wheel.



STEAM-ENGINE GOVERNOR.

GOVERNOR'S ISLAND. An island in Boston harbor, Massachusetts, occupied entirely by the national government for purposes of defense

(Map: Boston, F 5). The principal fortification is Fort Winthrop.

GOVERNOR'S ISLAND. A small island in the Bay of New York, near the lower point of Manhattan Island, at the entrance of the East River (Map: New York City, Greater New York, D 6). Its original area of 65 acres has been about doubled by the addition of "made land," and many other improvements have been made. It is occupied entirely by the national government for military purposes. The forts are Jay, Castle William, and South Battery. There are some fine buildings for the principal officers, the island being the headquarters of the military division of the Atlantic. See Fort Jay.

GOVI, gō′vē, Gilberto (1826–89). An Italian scientist, born at Mantua. He successively occupied the chair of physics at Florence, Turin, and Naples. He was a voluminous writer and enjoyed considerable repute as a scientist, in which capacity he represented Italy at the International Commission on the Metric System, held at Paris in 1872. His principal writings include: *Metodo per determinare la lunghezza del pendolo* (1866); *Galileo Galilei* (1864); *Romagnosi e l' elettro-magnetismo* (1869); *Il Sant' Uffizio, Copernico e Galileo* (1872); *Leonardo letterato e scienziato: studio sul genio e sulle scoperte di Leonardo da Vinci* (1872); *Teoria dell' elettroforo* (1882).

GOVIND, gô-vĭnd′, or **GOVIN′DA.** The familiar scavenger kite of East Indian towns. See Kite.

GOW, gou, George Coleman (1860–). An American teacher of music. He was born at Ayer, Mass., graduated from Newton Theological Institution in 1889, and studied one year in Berlin. He was instructor in musical theory and composition at Smith College from 1889 to 1895, when he became professor of music at Vassar College. In 1912–13 he was president of the Music Teachers' National Association. Besides contributions to musical magazines he is author of several songs and of *The Structure of Music* (1895).

GOWAN, gou′an. See Daisy.

GOWAN, gou′an, Ogle Robert (1796–1876). A Canadian journalist and legislator. He was born in County Wexford, Ireland, and removed in 1829 to Escott, Leeds Co., Upper Canada, and became distinguished as a commander of British troops during the rebellion of 1837–38, rising to the rank of lieutenant colonel. The name of "The Queen's Royal Borderers" was conferred upon the regiment which he had commanded. As a political and religious pamphleteer Gowan had become known in Ireland before 1829, and shortly after his arrival in Canada he wrote an able pamphlet on responsible government. In 1834 he was elected a member of the Parliament of Upper Canada, and served in that body till 1841. In 1844–48 and in 1858–61 he was a Conservative member of the Legislative Assembly of Canada. He was the founder and for 20 years the grand master of the Orange Lodges of British America, and as such wielded a powerful political influence in favor of the Conservative party. He wrote two books on the subject, and also was conspicuous in Masonry. He was editor of the Brockville *Statesmen* in 1829–51 and the *Patriot* and the *British Empire* (Toronto) in 1851–55.

GOWER, gou′ẽr, John (c.1325–1408). An English poet. He was probably connected with the family of Sir Robert Gower (died about 1349), a large landholder in Suffolk and in Kent. He married (probably for the second time) in 1397. He was then residing in the priory of St. Mary Overies, Southwark. In some way he made money, with which he bought land. It is inferred from his writings that he was a merchant, very likely an exporter of wool. Chaucer dedicated to him *Troilus and Cressida,* and before going abroad in 1378, nominated him one of his attorneys. Gower, in turn, paid Chaucer a compliment near the close of the *Confessio Amantis* (first version). In 1400 Gower became blind. He died in 1408 (between August 15 and October 24), and was buried in St. Saviour's Church, Southwark.

Gower sought to rest his fame on three great poems, written in three languages, French, Latin, and English. To each poem he gave a Latin title. The first, *Speculum Meditantis* (assigned to 1376–79), long supposed to be lost, was identified by G. C. Macaulay, in 1895, with a manuscript in the Cambridge University library, bearing the title *Mirour de l'Omme.* The poem aims to give a complete account of the moral nature of man and to explain God's dealings with him and the world. The second poem, *Vox Clamantis* (1382–?84), written in Latin elegiac verse, describes the insurrection led by Wat Tyler. Of the third poem, *Confessio Amantis,* there are two versions, one dedicated to King Richard II and the other to Henry of Lancaster. They are assigned respectively to 1383 and 1393. The poem, which contains about 30,000 octosyllabic lines, is divided into a prologue and eight books. After the long prologue descriptive of the degradation of the time, a lover appeals to Venus to cure his malady. Venus sends a confessor called Genius to shrive him. Then ensues a long dialogue, in which the confessor relates current moral stories for the purpose of warning the lover against the various vices. Besides these longer works, Gower wrote minor poems in French, Latin, and English. Among them are the *Traitié* (?1397) and the *Cinkante balades* (?1399), both in French verse. The former sets forth the nature of the marriage state; the latter, a collection of 51 ballades, contains more poetic feeling than Gower's other poems. Chaucer called his contemporary "moral Gower." The epithet exactly describes the intent of all his work. Possessing no originality, Gower took tales from many sources and moralized them. Popular in his own time, and long regarded as the equal of Chaucer, he has become for the modern reader tedious and monotonous. With some exaggeration, Lowell called him "the undertaker of the fair mediæval legend." His work, however, has very great philological interest. His *Complete Works* were edited by G. C. Macaulay (New York, 1899–1902). A study of one aspect of Gower's work is found in W. G. Dodd, *Courtly Love in Chaucer and Gower* (New York, 1913).

GOWER, Lord Ronald Sutherland (1845–1916). An English sculptor and author. He was born in 1845 at Stafford House, the youngest son of the second Duke of Sutherland, and was educated at Eton and at Trinity College, Cambridge. Among his works of art are "Marie Antoinette on her Way to Execution," "The Old Guard at Waterloo," the "Shakespeare Monument" at Stratford, and "Christ," presented to the city of New York in 1889. Among his publications are the interesting *Reminiscences* (1883); *Life of Joan of Arc* (1893); *Last Days* of *Marie Antoinette* (1885); *The Tower of London* (1901); *Gainsborough* (1906); and *Stafford House* (1910).

GOW'ERS, Sir William Richard (1845–1915). An English physician, born in London, and educated at Christ Church College School at Oxford and in University College, London. He became consulting physician of the University College Hospital and of the National Hospital for the Paralyzed and Epileptic; received honorary degrees from Dublin and Edinburgh universities; and was knighted in 1897. His great *Manual of Diseases of the Nervous System* (1886–88; new ed., 1904) has been translated into German, Spanish, and Italian and is a standard work. Among his other publications are: *Diagnosis of Diseases of the Spinal Cord* (1880), *Epilepsy and other Chronic Convulsive Diseases* (1881), *Diagnosis of Diseases of the Brain* (1885). The sensory fascicle of the spinal cord immediately outside the lateral basis bundle is called the "tract of Gowers," or the ventrolateral ascending tract. See Nervous System and Brain.

GOW'LAND, William (1842–). An English metallurgist. He was born in Sunderland, Durham, and was educated at the Royal College of Chemistry and the Royal School of Mines. In 1872–88 he was in Japan as chemist, assayer, and foreign head of the Imperial Mint. Upon his return to England he entered the employ of a great copper company and became professor of metallurgy in the Royal School of Mines. He was known as an archæologist, and had charge of preservation work at Stonehenge, where his discovery of stone mauls, and no metal tools, led him to date the construction of the monument at the end of the neolithic period. He also made careful studies of primitive metallurgy.

GOWN, Academic. See Degree.

GOW'RIE CONSPIRACY. One of the most mysterious events in the history of Scotland. It took place in August, 1600. John Ruthven, third Earl of Gowrie, was then residing on his estate at Perth, and with him lived his brother, Alexander Ruthven. There was ill feeling at the time between the Earl and James VI, afterward James I of England, who had put the Earl's father to death for treason, and who owed Gowrie a large sum of money. On the 5th of the month, the King, with a few attendants, visited Gowrie Castle in order, as Alexander told a servant, to confer with the Earl in regard to the debt. After dinner Alexander led the King to a private study on "a quiet errand." and Gowrie took the other guests into the garden to eat cherries. While the guests were thus engaged, a servant came and told them that the King had quit the castle and had ridden off to the Inch. Gowrie left the company for a moment, and on his return confirmed the servant's report. While the guests were in great excitement, not knowing what to do, they heard the King shouting "Treason!" from the study window, and looking up, caught a glimpse of his face. Naturally suspecting Gowrie, they tried to seize him; but as he escaped, four of them made their way to the study, where they are said to have found Alexander Ruthven struggling with the King. They killed Ruthven with their daggers, after which Gowrie, accompanied by his servant, Cranston, burst into the room with a sword in each hand. Though he fought desperately to avenge his brother, he was overpowered and killed. In the room with Ruthven the King had found a man in armor, who, it was afterward alleged, was Henderson, Gowrie's chamberlain. This man testified in court that Gowrie had ordered him to go to the chamber, put on his armor, and do Ruthven's bidding. As it appeared that Henderson had not raised his hand against the King, he was pardoned. The court used torture to extort evidence from Gowrie's servants, and accepted nothing in favor of their master. Three servants were hanged, the estates of the Ruthvens were confiscated, their name and honors were abolished, and the house in which the strange event took place was destroyed. In explanation of the mystery it has been suggested that the Ruthvens were the tools of Queen Elizabeth, who may have wished to secure possession of the King's person in order to control Scotland in his name, but in her own interest. Possibly, however, there was no plot—a quarrel over the debt may have led to violence, after which the King, with the help of the court, may have contrived the story to hide his own fault. Consult: *Register of the Privy Council of Scotland*, vi; *Acta Parl. Scot.*, iv; Mackenzie, *An Historical Account of the Conspiracies by the Earls of Gowry and Robert Logan of Restalrig against King James VI* (Edinburgh, 1713); Burton, *History of Scotland* (ib., 1867–70); Tytler, *History of Scotland* (ib., 1828–43); Barbé, *Tragedy of Gowrie House* (Paisley, 1887); Pitcairn, *Ancient Criminal Trials in Scotland* (Edinburgh, 1833); Calderwood, *History of the Kirk of Scotland* (ib., 1842–49); Lang, *James VI and the Gowrie Mystery* (London, 1902) and *A History of Scotland*, vol. ii (Edinburgh, 1902); Hume Brown, *History of Scotland*, vol. ii (Cambridge, 1909).

GOYANA, gô-yä'nȧ. A city of Brazil, in the State of Pernambuco, situated on the Goyana River, 18 miles from its mouth. It manufactures sugar and alcohol, and carries on an active trade in sugar, cotton, and dyewood. During the war with the Dutch in the seventeenth century, Goyana was an important centre. Pop., 28,000.

GOYATACAN, gō'yȧ-tȧ-kän'. A tribe of eastern Brazil, South America. Consult: Karl von Steinen, *Durch Central Brasilien* (Leipzig, 1886); B. Tavero-Acosta, *En el Sur* (Ciudad-Bolívar, 1907); A. Ernst in *Zeitschrift für Ethnologie*, vol. xxxiii (Berlin, 1891); Rivet in *L'Année Linguistique*, vol. iv (Paris, 1912).

GOYA (Y LUCIENTES), gō'yȧ ė lo͞o-thyān'-tās, Francisco José de (1746–1828). The leading painter, etcher, and designer of the Spanish school in the eighteenth century. He was born March 30, 1746, at Fuendetodas, a village of Aragon, near Saragossa. According to the most likely tradition, his family were peasants, who nevertheless placed their son in the academy established at Saragossa by José Lusan y Martinez, a painter of ability, who had studied in the Neapolitan school. According to tradition, Goya was obliged to leave Saragossa on account of some escapade, and went to Madrid. There he was powerfully affected by the works of Velazquez (q.v.) and by the great frescoes Tiepolo was then painting in the Royal Palace. He seems to have studied with Francesco Bayeu, a classicist and disciple of Raphael Mengs. After some years in Madrid he went to Rome. He studied the Italian masters rather by contemplation than by actual copying, and in Rome, as everywhere, was most interested in the picturesque life of the people. Returning to Spain, he received at Saragossa his first important commission, the frescoes of the ceiling of the church of Santa María, with the "Adoration of God." In 1772–74 he painted in the Cartuja Aula Dei, a Carthusian convent 10 kilometers north of Saragossa, a large series of frescoes of the "Life of the Virgin," many of which survive in a damaged but unrestored condition. In 1775 Goya returned to Madrid. He was employed by Raphael Mengs, then superintendent of fine arts in Madrid, to design cartoons for the royal manufactory of tapestries at Santa Barbara intermittently until 1791. There were 92 in all, woven on high and low warp looms from 45 cartoons, which are still preserved along with the tapestries in the Escorial and Prado. The subjects are characteristic pictures of contemporary Spanish life, such as "Child Riding a Sheep," the "Washerwoman," the "Seesaw," the "Reapers." About 1780–81 he frescoed a chapel of the church of Santa María del Pilar at Saragossa, and between 1787 and 1798 he painted the decoration of the palace of Alameda near Madrid. Goya's most monumental work is the cupola frescoes of the church of San Antonio de la Florida, near Manzanares, finished in 1798, a series of religious pictures from the life of St. Anthony, showing the influence of Tiepolo. This is the period of his greatest success. In 1788 he was made member by merit of the Academy of San Fernando in Madrid, and in the same year painter of the chamber to the new King, Charles IV. Ten years later he was made chief painter of the chamber. He was created lieutenant director of the Academy of San Fernando in the place of Andreas Calleja in 1793.

The insurrection of March 19, 1808, which ended the reign of Charles IV, interrupted the career of Goya. He endeavored to associate himself with the Bonapartes, even serving on the commission to select 50 of the best Spanish pictures for the Louvre. After a time, however, the French occupation exasperated him. After the return of the Bourbon King Ferdinand VII in 1813, Goya was reinstated as painter of the chamber. His political views forced him to leave Spain, and in 1822 he visited Paris for the first time. With the exception of a short visit to Madrid in 1827, when his portrait was painted by his successor, Vicente López, he passed the rest of his life at Bordeaux, where he died April 16, 1828.

The chief interest of Goya was with the lower classes. He loved a vagabond life, and even at the summit of his success was most often to be found in the resorts of the common people. From them were taken the motives and subjects for the immense mass of drawings, etchings, water colors, genre pictures, and portraits which he left. Using a very simple palette, he painted directly, without glazes. His brilliant style was unique, but his technical qualities were founded upon a profound study of the great technicians of the seventeenth and eighteenth centuries. Goya was quite celebrated as a portrait painter, but his portraits were only good when the subject pleased him. Among his best portraits are those of himself, one in the Academy of San Fernando; a group of Charles IV and his family, in the Prado; equestrian portraits of Charles IV and his Queen, Maria Louisa, in the Prado; the Duke of Ossuna, his wife and family. He appears at his best in the marvelous double portrait of "La Maya," in the Academy of San Fernando, representing the same beautiful young girl nude and lightly draped. While his paintings can only be studied at Madrid, he is represented also in other public collections, Berlin, London, and Paris, especially in the Louvre. The Metropolitan Museum, New York, has his portrait of Don Sebastian Martinez and "Jewess of Tangier"; and the Hispanic Society, New York, the admirable portraits of the Duchess of Alba (whose name scandal linked with the artist's and whom he painted many times) and General Forastera, besides many drawings. Mention should also be made of his genre subjects, street fights from the insurrection of 1808 (Prado) and other folk scenes, bullfights (Berlin) and other popular amusements.

Goya ranks as one of the world's greatest etchers. No one has ever used the needle with greater vivacity, freedom, and strength than he. He was the first master to realize the possibilities of the aquatint (q.v.). His technical means are very simple—the broad massing of sharply contrasted light and shade; he possesses a wonderful narrative and selective power. Among his earliest plates were a series of 16 after important paintings by Velazquez. His most celebrated series are: "Los caprichos" (Caprices), a bitter satire upon government, religion, and society; "Los desastres de la guerra" (Disasters of War), the testament of a Liberal; and the "Tauromaquia" (Bullfight). In his last years he took up the newly invented art of lithography, achieving great success in such prints as the series "Los toros de Bordeos" (Bulls of Bordeaux).

As a designer of tapestries, he stood first among Spanish painters, and the reputation of the Santa Barbara factory, Madrid, which is still in operation, rests mainly on his designs. Goya's place in art is unique—the greatest Modernist of his day, the first of the nineteenth century to break the shackles of classicism and to solve the problems of light and movement. His influence on the leaders of modern painting, such as Delacroix and especially Manet, was very great.

Bibliography. The traditional view of Goya's wild life and eccentric character is based upon the biography by Zapater (Saragossa, 1868). This exaggerated point of view was spread by the biography of Yriarte (Paris, 1867). The most scholarly and critical life of Goya is by Von Loga (Berlin, 1903); the best English work by Calvert (London, 1908). Others are by Brunet (Paris, 1865); Lefort (ib., 1877); Lafond (ib., 1909); Oertel (Bielefeld, 1907); Stokes (New York, 1914). Brief popular accounts and appreciations are by Rotenstein (Leipzig, 1900) and Muther (London, 1905). For his etchings, consult Bertels in the *Klassiche Illustratoren* series (Munich, 1907), and Hind, in *Great Engravers* (London, 1911). The best catalogue of his etchings is by Hofmann (Vienna, 1907). His tapestry designs are best discussed by Villaamil, *Los tapices de Goya* (Madrid, 1870), and Hunter, *Tapestries* (New York, 1912).

GOYAZ, gô-yäz′ (from the extinct Indian tribe of *Guayazes*). A state of Brazil, bounded by the states of Pará and Maranhão on the north; by Maranhão, Piauhy, Bahía, and Minas-Geraes on the east; by Minas-Geraes and Matto-Grosso on the south; and by Matto-Grosso and Pará on the west (Map: Brazil, H 6). Area, 236,232 square miles. Goyaz forms a part of the Brazilian table-land, and it has a number of mountain ranges forming chains from north to south in the western part of the state and along the eastern boundary. Forests are found only along the rivers, but a large part of the state is covered with a low brushwood. The chief rivers are the Tocantins, which flows northward through the central part of the state, and the Araguaya, which forms the west boundary. Little is known of the northern part of Goyaz. The climate of the state is moderate and generally healthful. In spite of its abundant natural resources and favorable climate, Goyaz is one of the most isolated and least developed of the Brazilian states. One of the chief reasons for this is to be found in the lack of transportation facilities. The large rivers are rendered unfit for navigation by their numerous rapids, and railways are only in the constructive stage. Stock raising is the principal industry; agricultural possibilities are undeveloped. The gold deposits, once extensive, seem to be nearly exhausted; other mineral resources, iron, marble, silver, and copper, are unexploited. The chief centres of population are found in the south. Pop., 1890, 227,572; 1900, 255,284; 1911 (official estimate), 340,000. The Indians number about 25,000, and there are large numbers of negroes. Capital, Goyaz (q.v.). In the southern portion of the state a territory of about 5500 square miles has been set aside for the future capital of the Republic of Brazil.

GOYAZ (formerly Villa Boa de Goyaz). A city of Brazil, and the capital of the state of the same name, situated on the river Vermelho, 600 miles northwest of Rio de Janeiro (Map: Brazil, H 7). The town is handsomely built; the principal buildings are the cathedral, government palace, and town hall. It has law and normal schools. Some gold is found in the river Vermelho, and both gold and diamonds in the neighboring district. The city was founded in the latter part of the seventeenth century by the son of Bueno de Silva, one of the early explorers of the region. Pop., 25,000. Pop. of state in 1900, 255,284.

GOYEN, goi′en, JAN VAN (1596–1656). A Dutch landscape painter. He was born at Leyden, Jan. 13, 1596, and after studying under various masters and spending a year in France, he finally became a pupil of Esaias van de Velde of Haarlem, who had the greatest influence upon his art. He then practiced in Leyden, but in 1631 he sold his house there and removed to The Hague, where he became a citizen in 1634 and dean of the Painters' Guild in 1640. At The Hague he prospered greatly in his art, numbering among his patrons the Stadholder Frederick Henry and the Town Council; but his restless spirit sought occupation also in arranging sales of pictures and in extensive speculations in real estate and in tulips. These ventures proved unfortunate, and he died insolvent about the end of April, 1656.

Van Goyen is perhaps the most characteristic of Holland's landscape painters. His subjects are its most typical scenery—harbor, canal, and river banks, with boats and ships, the grassy downs, or winter scenes with skating and sleighing. These he depicts with a naturalistic truth undisturbed by sentimental motives, much as Frans Hals depicts the people of Holland. His paintings were at first detailed in execution and bright in color, like those of his master Van de Velde, but he soon acquired the tonal qualities which are the chief characteristic of his work. Although his paintings are usually dominated by a sad tone, usually grayish green, he avoids monotony by subtle local color and by an admirable treatment of light and shade. His execution is unusually facile and economical of means; his mastery of atmosphere and perspective is complete. His skies with flitting cloudlets are particularly fine. His numerous paintings are well represented in nearly all the public collections of Europe and in many private collections, both in Europe and America. Among the most typical are the large panorama of Haarlem painted in 1651 for the municipality and now in the town museum; the "View of Dordrecht" (1650), Rijks Museum, Amsterdam, a subject which he painted nine times; "Banks of a Canal" (1653), Louvre; "Environs of Haarlem" (1646), Metropolitan Museum, New York. Consult Bode, *Great Masters of Dutch and Flemish Painting* (London, 1908).

GO′ZAN. 1. A province in Mesopotamia, called Guzanu in the Assyrian inscriptions and Gauzanitis by Ptolemy, situated on both sides of the river Chabur (Khabur), a tributary of the Euphrates, and comprising roughly the northern half of the later Kingdom of Osrhoene. It seems to have been added to the Assyrian Empire in the ninth century B.C. In 809 it revolted against Adadnirari V (812–783) and again in 759 against Asurdan III (773–753), but was finally subdued in 758. This province was ruled by a prefect who occasionally appears as *limmu*, after whom the year was named. In this district a colony of Israelitish exiles was settled by Sargon II (722–705 B.C.), after Samaria had been captured by Shalmaneser V (728–722) in 723 (2 Kings xvii. 6; xviii. 11). (See SAMARIA.) 2. A city situated between Nisibis and Tushchan in Mesopotamia, probably the capital of the Province of Gozan. Consult: Delitzsch, *Wo lag das Paradies?* (Leipzig, 1881); Schrader, *Keilinschriften und Geschichtsforschung* (Giessen, 1878); Winckler, *Alttestamentliche Untersuchungen* (Leipzig, 1892); Jeremias, *Das Alte Testament im Lichte des Alten Orients* (ib., 1906).

GOZLAN, gôz′läɴ′, LÉON (1803–66). A French novelist and playwright, born at Marseilles. After trying his hand at various professions, he became a journalist. He was for a time president of the Société des Gens de Lettres and also of the Société des Auteurs Dramatiques. His productions include: *Aristide Froissart* (1843); *Les émotions de Polydore Marasquin* (1857); *La nuit blanche* (1844); some souvenirs of Balzac, *Les jardins, Balzac en pantoufles* (1856). His two best plays are *La pluie et le beau temps* and *Une tempête dans un verre d'eau.* His *Châteaux de France* (2 vols., 1844) is of rather important archæological value and contains very useful illustrations.

GOZO, or **GOZZO**, gŏt′sȯ (Lat. *Gaulus*). An island belonging to Great Britain in the Mediterranean, situated about 4 miles northwest of Malta, with which it was probably at one time connected (Map: Italy, E 6). Its area is 25 square miles. The surface is diversified and consists largely of coraline limestone. It has a rich and well-cultivated soil. There are some Phœnician remains in the shape of Cyclopean walls and some Roman monuments. Chief town, Victoria, formerly called Rabat. Pop., 1901, 20,003; 1907 (est.), 21,911.

GOZZI, gŏt′sē, Carlo, Count (1720–1806). An Italian dramatist, born at Venice, brother of Gasparo Gozzi. He began in his youth to write, and his pieces, slight but satirical, were directed against Goldoni, in defense of the Commedia dell' Arte with its accepted types, which Goldoni had abandoned. In 1761 he wrote what he called a "dramatic fairy tale," *Fiaba dell' amore delle tre melarancie,* which was received with enthusiasm. This was followed by others on the same order; among them *Turandot,* translated by Schiller, and *L'Angellin Bel Verde,* and others taken from old Italian fairy lore or Oriental tales. For a while these held a prominent place on the Venetian stage, attracting the public by their spectacular features and liveliness. Gozzi also adapted French and Spanish plays and wrote some dramas modeled after Calderón. His fairy plays (written in the Venetian dialect) are little known outside Italy; they deserve a wider reputation. One of his last and most interesting works is *Memorie inutili* (1797; new ed., Bari, 1910), trans. by Symonds (1889). He edited part of his own works (1772–74); a complete edition was published in 1802. The best edition of the *Fiabe* is that of E. Masi (Bologna, 1884). Consult: Magrini, *I tempi, la vita e gli scritti di Carlo Gozzi* (Benevento, 1883); id., *Carlo Gozzi e le fiabe* (Venice, 1883); Masi, *Sulla storia del teatro italiano nel secolo XVIII* (Florence, 1892); Paget, *Studies of the Eighteenth Century in Italy* (2d ed., Chicago, 1908).

GOZZI, Gasparo, Count (1713–86). An Italian author, born at Venice, brother of Carlo Gozzi the dramatist. He attempted the management of the Sant' Angelo Theatre in Venice and translated plays from the French for representation there, but failed signally. He then founded the *Gazzetta Veneta* (1760–61); and later the *Osservatore Veneto* (1761–62), taking as a model Addison's *Spectator.* He aimed at reviving in Italian literature the simplicity and sincerity threatened by academic pettiness. He revived the cult of Dante through his defense of Dante against Bettinelli in *Giudizio degli antichi poeti sopra la moderna censura di Dante, etc.* (1755), and wrote clever satirical verse as well as prose, holding up to gentle ridicule the foibles of his contemporaries. Works (12 vols., Venice, 1794; 20 vols., Bergamo, 1825–29). Among his many writings are *Il mondo morale* and *Sermoni.* Consult: Pindemonte, *Elogio del conte Gasparo Gozzi* (Venice, 1787); Gherardini Giovanni, *Vita di Gasparo Gozzi* (Milan, 1821); N. Tommaseo, "G. Gozzi, Venezia e l' Italia de suoi tempi," in *Storia civile nella letteraria* (Turin, 1872); Malmignati, *G. Gozzi e i suoi tempi* (Padua, 1890).

GOZZO, gŏt′sō. See Gozo.

GOZZOLI, gŏt′sō-lē, Benozzo, properly Benozzo di Lese (1420–98). A Florentine painter of the early Renaissance. He was born at Florence, and began his career as a goldsmith, assisting Ghiberti on the bronze gates of the baptistery at Florence. A pupil of Fra Angelico, he assisted him in the painting of the vault in the chapel of the Madonna di San Brizio, in the cathedral at Orvieto, in 1447; the following two years he was at Rome. On leaving Angelico in 1449 he went to Montefalco, where in San Fortunato he painted, among other works, a triple series of frescoes from the life of St. Francis in the choir of San Francesco. He was active at Viterbo, at Perugia (1456), at Rome (1458). Returning to Florence, he completed in 1459 his masterpiece, the frescoes in the private chapel of the Riccardi Palace, Florence. The subject is the "Procession of the Magi," with "Angels" in the tribune above—all interpreted as a pageant of the fifteenth century. The procession contains many portraits, including Lorenzo, Piero, and other Medici; the Emperor John Palæologus and the Patriarch Joseph; Sigismondo Malatesta and the artist, 17 chief subjects, affording an inimitable picture of the life of his day. It is executed with the charm of a miniature on a large scale, and a decorative quality rarely equaled in the same century. From 1464 to 1467 he painted an important series from the life of St. Augustine, in the church of San Agostino at San Gimignano. Of especial charm is "St. Augustine Teaching Rhetoric at Rome," showing a Renaissance scholar in the classroom. The series of 22 frescoes on the wall of the Campo Santo, Pisa (1469–85), shows his versatility in the interpretation of scenes from the history of the Old Testament, beginning with the "Life of Noah" and ending with the "Visit of the Queen of Sheba to Solomon." In the former the "Invention of Wine by Noah" is a Tuscan vintage scene; while the "Tower of Babel" represents the Medici family inspecting a building. In this as in other great frescoes series he made use of assistants. He had houses and land in Florence and a house in Pisa, and after his death at Pistoia (Oct. 4, 1498) he was interred in a tomb of the Campo Santo presented him by the Pisans. His life is said to have been one of singular rectitude. His color was light and pleasing in tone; his drawing often deficient; his technique smooth in quality; his subjects were interpreted with a religious feeling and poetic naturalness, each detail being painted with a goldsmith's love for the decorative quality. His story-telling quality is his greatest achievement, revealing his varied interests as a portrait painter, landscape painter, animal painter, costumer, architect, and decorator. His easel pictures are rare. The best known are "Madonna with Four Saints," in the Gallery of Perugia; "Madonna with Saints and Angels," in the National Gallery, London; and the "Apotheosis of St. Thomas Aquinas," in the Louvre. Consult: Crowe and Cavalcaselle, *History of Italian Painting,* ed. by Douglas, vol. iv (London, 1911); Supino, *Il campasanto di Pisa* (Florence, 1896); Stokes, *Benozzo Gozzoli* (London, 1903), brief and popular; Mengin, *Benozzo Gozzoli* (Paris, 1909).

GRAAF, gräf, Regnier de (1641–73). A celebrated Dutch physician, born at Schoonhoven. He studied under Sylvius at the University of Leyden. In 1664 he published his *Disputatio Medica de Natura et Usu Succi Pancreatici,* which gained for him a great reputation. He studied at Löwen, Utrecht, and Leyden, and settled at Delft. He discovered, in 1672, the follicles of the ovary which are named after him. He published several dissertations on the organs of generation in both sexes, which involved him in a controversy with Swammerdam. An edition of his complete works was first published in 1677.

GRAAF′IAN FOLLICLES, or **VESICLES.** See Graaf; Ovary.

GRAAF REINET, gräf rī′nĕt. The oldest and largest town in the Midland district of the Cape Province, South Africa, and a strong Dutch centre, situated on the Sunday River, 184 miles by rail from Port Elizabeth (Map: Cape of Good Hope, G 9). It lies in the heart of the Karoo, and from its numerous orchards, vineyards, and gardens, due to a plentiful water supply, it is known as the "Gem of the Desert." It is the centre of the South African mohair trade and produces wine and fruit in large quantities. The Dutch Church, founded in 1786, a large modern building, seating 1500, cost some $90,000, and is one of the finest churches in South Africa. There is also a large college attended only by Dutch students. Near the town are mineral springs. Pop., 1911, 8129, of whom less than half were white.

GRAAL, grāl, Holy. See Grail, The Holy.

GRAB (Marathi *gurāb*, *ghurāb*, from Ar. *ghurāb*, from *gharaba*, to go). The Anglo-Indian name for the large flat-bottomed coasting vessel, of 150 to 300 tons, used on the coast of Hindustan. It has usually two masts. Its most peculiar feature is the extension of the upper deck over the projecting prow, the extension being separated from the forecastle by a bulkhead. When armed, as many of them have been in the Royal Indian Marine, these vessels carried 12-pounders, or guns of less calibre. They were also used at one time by the native pirates of the coast.

GRÄB, grȧp, Karl (1816–84). A German architectural and landscape painter. He was born in Berlin, where he studied under the Court Theatre painter, J. Gerst, and at the Academy. In 1839 he set out to travel in Switzerland, southern France, the Pyrenees, Italy, and Sicily, and after his return, in 1843, was for several years associated with Gerst in decorative work, but about 1851 devoted himself almost exclusively to easel pictures, cultivating architectural subjects, especially the interiors of mediæval churches, which he depicted with a rare knowledge of perspective and architectural detail, vigorous coloring, and beautiful light effects. Among the finest of these views are: "Choir in the Cathedral at Halberstadt" (1854), Ravené Gallery, Berlin; "The Scaliger Tombs in Verona" (1859); "Tombs of the Mansfeld Family in St. Andrews at Eisleben" (1860) and "Lectern in Halberstadt Cathedral" (1870), both in the National Gallery, Berlin; "Interior of Old Synagogue in Prague" (1876), in the Breslau Museum. His landscapes are likewise of a high order, and in water colors he painted, by royal order, 94 views from the castles of Stolzenfels, Potsdam, Charlottenburg, and others. In the new museum at Berlin he executed two mural paintings of ancient Athens and Olympia. He was made court painter in 1851, professor at the Academy in 1855, and was awarded the great gold medal at the Berlin Exhibition in 1854.

GRABAU, grā′bō, Amadeus William (1870–). An American paleontologist, born at Cedarburg, Wis. He graduated from Massachusetts Institute of Technology in 1896 and studied at Harvard University (S.M., 1898; S.D., 1900). In 1901 he married Mary Antin. (See Grabau, Mary Antin.) After serving as professor of geology at the Rensselaer Polytechnic Institute, Troy, N. Y. (1899–1901), he became adjunct professor of paleontology in 1902 and full professor in 1905 at Columbia University. He also served as paleontologist on the Michigan Geological Survey. He is author of *North American Index of Fossils, Invertebrates*, with H. W. Shimer (2 vols., 1909–10), and *Principles of Stratigraphy* (1913).

GRABAU, Mary Antin (1881–). An American writer. Born in Polotzk, Russia, she emigrated to America in 1894. She was educated in the public schools and in the Girls' Latin School of Boston and studied at Teachers College (Columbia University) in 1901–02 and at Barnard College in 1902–04. She married Prof. Amadeus William Grabau in 1901. Her first book (1899) was called *From Polotzk to Boston* (1899), but it was not until 1912 that she gained wide recognition through *The Promised Land*, in which she tells in a peculiarly vivid and convincing way of her early life in Russia, emigration to America, and experiences in the new environment. She wrote also *They who Knock at our Gates* (1914).

GRABBE, gräb′be, Christian Dietrich (1801–36). A German dramatist, born at Detmold. He studied law at Leipzig and Berlin and wrote his first drama at 18, *Herzog Theodor von Gothland*, an eccentric but promising piece. He then went on the stage and, after failing as an actor, returned to the law and finally obtained a military position in his native town (1827). This he did not keep long, owing to his irregular life, and he ultimately died from the effects of continued drinking. His plays further include: *Don Juan und Faust* (1829); *Friedrich Barbarossa* (1829); *Heinrich VI* (1830); *Napoleon oder die Hundert Tage* (1831); *Hannibal* (1835). His dramas betray dramatic power of a high order, but are marred by eccentricities of language and faulty construction. His complete works were published at Leipzig in 1870 and at Detmold in 1874; a critical edition by E. Grisebach (4 vols., Berlin, 1902). Consult also Ziegler, *Grabbes Leben und Charakter* (Hamburg, 1855), and a study by C. A. Piper (Berlin, 1898).

GRABE, grä′be, John Ernest (1666–1711). A German biblical and patristic scholar. He was born at Königsberg and was educated there. Becoming dissatisfied with the Lutheran church, he thought of joining the Catholic church, but changed his mind and betook himself to England instead. He settled at Oxford in 1695 and won distinction by his histories of the early Church, his editions of the Fathers, and particularly of the Septuagint (1707–19). He died in London, Nov. 3, 1711.

GRABEN-HOFFMANN, grä′ben hȯf′mȧn, Gustav. See Hoffmann, Gustav (Graben).

GRABOW, grä′bȯ, Wilhelm (1802–74). A Prussian politician, born at Prenzlau (Brandenburg). He studied at Berlin, became councilor of the city court, and was a prominent Liberal member of the United Diet of 1847–48 and of the National Assembly of 1848, acting for a short time as its President. From 1862 to 1866 he was repeatedly elected President of the Lower Chamber of the Prussian Diet. He was a consistent opponent of Bismarck in Prussian politics, leaving the Diet finally because of Bismarck's overbearing methods.

GRABOWSKI, grȧ-bŏv′skė, Michal (1805–63). A Polish author, born in the Government of Kiev. He was one of the group of Ukrainians who gathered about Groza, Zaleski, and Goszczynski, and was an ardent defender of romanticism and an opponent of French literary standards. Besides critical writings, he wrote some novels in the manner of Scott. His works include: *Literatura i Krytyka* (1837–40); *Korrespondencya literacka* (1843–48); *Koliszczyzna i Stepy* (1838), a novel dealing with the peasant revolt of 1768; *Stannica hulajpolska* (1841); *Zamieć w stepach* (1862); *Taikury* (1845); *Pan Starosta Kaniowski* (1856); *Pamietniki domove* (1845); and an interesting work on *Ukraina dawna i teraźnicjsza* (The Ukraine as It Was and as It Is, 1850). His critical essays are superior to his novels.

GRACCHANUS, grȧ-kā′nŭs *or* grȧk-kä′nụs, M. Junius. A Latin author, who, according to Pliny, assumed his cognomen on account of his friendship with C. Gracchus. He wrote a treatise, *De Potestatibus,* addressed to T. Pomponius Atticus, the father of Cicero's friend, in which he gave an account of the Roman constitution and magistracies from the time of the kings. This work is lost, but it is frequently cited by Pliny, Varro, and Cicero, and parts of it are preserved in the *De Magistratibus* of Joannes Lydus. Consult: Gerlach, *Geschichtschreiber der Römer* (Hamburg, 1851); Mercklin, *De Junio Gracchano* (Dorpat, 1840–41); Huschke, *Jurisprudentia Anteiustiniana* (Leipzig, 1886).

GRAC′CHUS. The cognomen of a distinguished branch of the Gens Sempronia in ancient Rome. Many of the name became famous in history. The following are the most important:

1. Tiberius Sempronius Gracchus (?–212 b.c.). A general during the Second Punic War. Elected consul in 215, when Hannibal was scouring Campania and Apulia, he gathered a force of volunteer slaves (to whom he promised freedom, if the victory should be his) and provincials, and routed the Campanians with great loss near Cumæ, which he seized and held against the assaults of Hannibal's army. At the end of his consulship his *imperium* (q.v.) was continued, so that he could spend the year 214 in Apulia, with headquarters at Beneventum, from which the Carthaginian general Hanno tried in vain to dislodge him. He was consul again in 213 and carried on an active war in Lucania. In 212, while again operating in Apulia, he was betrayed by a Lucanian and perished in an unequal struggle with Mago the Carthaginian. Hannibal gave him the honor of a public funeral.

2. Tiberius Sempronius Gracchus (c.210 b.c.–?), statesman and general. As a young man, he served on the staff of the consul L. Cornelius Scipio in Greece (190); was tribunus plebis in 187; prætor in 181 in Spain, where by his tact and justice he brought the wild Celtiberian tribes under Roman control; consul in 177. He crushed a formidable revolt in Sardinia and returned to celebrate his triumph with large numbers of captives. As censor, in 169 he constructed the Basilica Sempronia, near the Roman Forum. He was special envoy in Asia Minor in 164 and consul again in 163 and established friendly relations between the Romans and some of the native rulers there. The year of his death is not known. He married Cornelia (q.v.), daughter of P. Scipio Africanus, by whom he had 12 children, all of whom died young but three—two sons, the famous Gracchi, and a daughter.

3. Tiberius Sempronius Gracchus, son of the preceding (c.163–133 b.c.). Tiberius and his brother Gaius (see below) were brought up under the special care of their mother, Cornelia, since their father died when they were very young. Tiberius had his first military experience in Africa, on the staff of his brother-in-law, Scipio Africanus the Younger, and took part in the capture and destruction of Carthage (146), on which occasion he is said to have been the first Roman to scale the city wall. In 137 he acted as quæstor to the army of the consul Gaius Hostilius Mancinus in Spain; the people of Numantia would treat with no other Roman than the son of their former benefactor. (See 2, above.) He was thus enabled to save from utter destruction an army of 20,000 Romans, who had been defeated and were at the mercy of the Numantines. But the peace was considered disgraceful by the aristocratic (senatorial) party at Rome and was repudiated. On their return to Rome the consul Mancinus was disgraced, as being wholly responsible, but Tiberius was held in high esteem by the populace, who saw in him a champion of justice. His interest in the cause of the common people was roused by the sight of the vast estates of wealthy Romans worked by gangs of slaves, while the poor free citizens had neither land nor means of employment. He determined to dedicate himself to the reform of this deplorable state of things and became a candidate for the tribuneship, to which he was elected in 133. The bill which Tiberius, as tribune, now proposed involved a renewing of the Licinian Rogations (q.v.; see also Agrarian Laws), with many modifications designed to lighten the hardships of those who in good faith or profiting by the laxness of a century or more had acquired "title" to the public domain. Such a bill was to be submitted to the vote of the people, tribe by tribe, in the *comitia tributa.* (See Comitia.) Its popularity was manifest, and its passage was assured, when the opposition found a means to block its way, at least temporarily. One of the tribunes, Cæcina, was induced to put a veto on the measure, and the veto of a tribune overweighed even the voice of the tribes themselves. Tiberius was forced to impeach the tribune, an unheard-of measure and one which laid him open to the charge of unconstitutionality. The *comitia tributa,* however, voted to depose Cæcina, and the obstacle was removed. The bill was thus passed, and a committee of three (*triumviri*), consisting of Tiberius himself, his brother Gaius, and Appius Claudius, was appointed to carry out its provisions. Not content with the aid given to small farmers by his new law, Tiberius now devised further means of aiding them to begin life with live stock and implements. He suggested that the wealth bequeathed to the Roman people by Attalus III (q.v.), King of Pergamus, should be devoted to this purpose. When the term of his tribuneship came to an end, he presented himself again for the office, as a measure of self-defense, though this was most unusual. The election took place in June, when the mass of his supporters were busy in the country, and when everything was favorable to the intrigues of his opponents. Partisan feeling ran very high, threats and calumnies were rife, and the election was marked by terrible riots, in one of which Tiberius himself was killed.

4. Gaius Sempronius Gracchus, younger brother of the preceding (159–121 b.c.). When Tiberius was murdered, Gaius was serving with the army in Spain, under his brother-in-law, the younger Scipio Africanus. He returned to Rome a year or two later, but took no part in

public affairs other than to deliver speeches in court, where his eloquence met with telling effect. Upon attaining the quæstorship (126), he went with the army, under the consul L. Aurelius Orestes, to Sardinia, then in revolt. He had a strong feeling that he should return to Rome to avenge his brother's death and take up his work, and it is said that in his dreams Tiberius' shade appeared and urged him on. Accordingly, when the Senate, to keep him longer away from Rome, extended his term as quæstor, he left Sardinia unexpectedly and went to Rome, to the discomfiture of his enemies and political opponents, who feared him and did not hesitate to resort to persecution and groundless accusations. Gaius stood for the tribuneship, and was elected in 123. He now renewed the enforcement of his brother's laws, which had gradually been allowed to lapse, and carried out important legislation—drafted in the interest of the people as opposed to that of the Senate and the nobles. To develop the resources of Italy and at the same time to employ the poor, he made new roads throughout all parts of the country, repaired old ones, and erected milestones. He had a law passed entitling every citizen who resided in Rome to grain at half price; made service in the army far less burdensome; had 6000 colonists sent out to found a colony on the site of Carthage; and aimed to diminish the power of the Senate and correspondingly to increase that of the *equites* (see Equestrian Order), especially by carrying laws which provided that jurors in trials of provincial governors for extortion should be chosen from the *equites*, not, as before, by the Senate, and that the gathering of the taxes of the new Province of Asia should be let out to the *publicani* (q.v.), who were *equites*. He was reëlected tribune in 122, with his friend and supporter, the ex-consul Fulvius Flaccus, among his colleagues. He now proposed a measure for the extension of the Roman franchise to all the Latins, offering at the same time "Latin franchise" to all the Italian allies of Rome. The aristocratic party, finding it impossible to check his reforms by open opposition, had recourse to the trick of offering in bad faith still greater advantages through M. Livius Drusus, thus undermining Gaius's influence with the people. Events drifted into civil war. Gaius's bitter enemy, L. Opimius, became consul; Gaius failed to gain the tribuneship the third time. Gaius Gracchus and Fulvius Flaccus were now deserted by most of their supporters; they were compelled to take refuge on the Aventine Hill. Negotiations proved of no avail. Flaccus and his eldest son were murdered, and Gaius, trying in vain to escape across to the Janiculum, seeing all hope gone, ordered his slave to kill him, who then also killed himself (121). For the careers of Tiberius and Gaius, consult their lives by Plutarch; Beesly, *The Gracchi, Marius and Sulla* (London, 1878); Mommsen, *History of Rome*, vol. iv (Eng. trans., New York, 1903–05); Meyer, *Untersuchungen zur Geschichte der Gracchen* (Halle, 1894); Greenidge, *History of Rome*, vol. i (London, 1904); Fowler, in *English Historical Review* (ib., 1905); Oman, *Seven Roman Statesmen of the Later Republic* (ib., 1902). For the family in general and for the ancient authorities, consult Nitzsch, *Die Gracchen und ihre nächsten Vorgänger* (Berlin, 1847), and Long, *Decline of the Roman Republic* (5 vols., London, 1864–74).

GRACE (from Lat. *gratia*, favor). An expression frequently used in the Scripture and theological discussion. Its distinctive meaning is the idea of free and unmerited favor. It is a benefit springing out of the liberality and freeheartedness of the giver, bestowed irrespective of the worth of its object. Applied to God in the Old Testament, it is His favor primarily to the Hebrew race, in the later books to individuals. The New Testament extends the application of grace to all men, without regard to race. St. Paul differentiates grace as the free gift of God, which man receives by faith. Theologians have distinguished grace into *common* or *general* and *special* or *particular*. Common grace is employed to denote the love which God has to all His creatures, and the light of nature and of conscience which they all enjoy. Special grace is the outflow of the love of God for lost sinners, by which He brings them to repentance and saves them. This special or saving grace is sometimes also divided in various ways and spoken of as *selecting, justifying, sanctifying* grace; also, in respect of man, as *imputed* or *inherent* grace—the grace, i.e., of Christ's righteousness imputed or reckoned to the account of those who believe on Him, and the grace of holy and pious dispositions wrought in the heart by the spirit of God.

In theology grace is a supernatural gift of God by which man is enabled to choose the right and so to find salvation. Protestant theology thinks of this grace as being manifested in Christ; Catholic theology, as manifested in Christ but dispensed by the Church, especially in the sacraments. Both regarded it as the direct act of God upon the hearts of men. The Augustinian and Calvinistic theology regarded grace as the supernatural origin of all man's good choices; Pelagian and Arminian theology, as coöperating with man's own good choices, and as necessary for the development of righteous character. For the *covenant of grace*, see Covenant. For the history of the doctrine to the Reformation, consult Harnack, *History of Dogma* (Boston, 1894–1900); for the Catholic doctrine, Lépicier, *De Gratia* (Paris, 1907); Liguori, *Opera Dogmatica*, ed. by Walter (New York, 1903); for the Protestant doctrine, Robinson, *Christian Doctrine of Man* (Edinburgh, 1911), and manuals of theology.

GRACE, Days of. A period allowed for the payment of a negotiable instrument, as a bill of exchange or promissory note, in addition to the time named in the paper itself. As the expression indicates, this additional period was formerly a matter of indulgence or favor on the part of the holder, but it has long been recognized by the courts as a matter of right. Chief Justice Marshall declared, nearly a century ago, that "the allowance of days of grace is a usage which pervades the whole commercial world. It is now universally understood to enter into every bill or note of a mercantile character and to form so completely a part of the contract that the bill does not become due, in fact or in law, on the day mentioned on its face, but on the last day of grace." Paper payable on demand has always formed an exception to this rule; and days of grace have been abolished by statute in several European countries and in most of the United States. Where days of grace are still recognized, the period allowed varies in different countries from 3 to 30. In Great Britain, and generally in this country, the number is three. Accordingly if a bill or note is dated February 1 and is payable three months after date, it matures May 4: that, and not May 1, is the day on which to demand payment and on which it is dishonored by nonpayment. If the last day of grace falls on Sunday or a bank holiday, the paper generally falls due on the second day of grace. The number of days to which a bill or note is entitled depends on the law of the place where it is payable, not of that where it is drawn, made, or indorsed. Consult the authorities referred to under NEGOTIABLE INSTRUMENT.

GRACE, WILLIAM RUSSELL (1832–1904). An American merchant and politician, born at Queenstown, County Cork, Ireland. He ran away from home when 14 years old and worked his way on a sailing ship to New York City. In 1850 he went to Callao, Peru, where he became a clerk in the firm of Bryce & Co., shippers and commission merchants. Two years later he was admitted to partnership and finally became the leading member of the firm, the name of which was changed to Grace Bros. & Co. He returned to New York in 1865 and organized the firm of W. R. Grace & Co., to trade with South and Central America, and in 1891 established the New York and Pacific Steamship Company. He was elected mayor of New York on the Democratic ticket in 1880 and again in 1884. He established Grace Institute in New York in 1897.

GRACE ABOUNDING TO THE CHIEF OF SINNERS. A work by John Bunyan, written in prison and published in 1666. It is autobiographical and one of the three great works on which this author's reputation rests.

GRACE NOTES. Mere embellishments, not essential to either the melody or harmony of a composition. They are called for by special signs or are written in notes of smaller type. During the sixteenth and seventeenth centuries the introduction of grace notes was left chiefly to the intelligence and taste of the performers. But this led to the abuse of overloading a composition by means of useless and often tasteless ornaments, so that J. S. Bach did not leave them to the performers, but took great pains in writing out in detail whatever embellishments he wished. Since Beethoven all grace notes are written by the composer. Although the original function of these embellishments was merely to render a composition more "elegant" and they can be left out without detriment to the music, Chopin completely revolutionized the employment of grace notes by using them in a novel and entirely original manner, so that in his works they become a means of deep emotional and artistic expression. In Chopin's compositions the grace notes form an essential part and cannot be altered or omitted without seriously affecting the character of his music. See APPOGGIATURA; ARPEGGIO; TRILL.

GRACES (Lat. *Gratiæ*, Gk. Χάριτες, *Charites*). In Greek mythology, originally goddesses of heavenly light, who bring fertility to the fields and joy to men; later, the personification of grace and charm. (See CHARIS; CHARITES.) Like all such divinities, they are at first anonymous and of varying number, and this is reflected in the local variations in their cult and names throughout Greece. At Orchomenus in Bœotia they had a very venerable shrine, where they were worshiped under the form of three stones, said to have fallen from heaven. In Hesiod we find them called Aglaia (Brightness), Euphrosyne (Joy), and Thalia (Bloom). These names attached themselves to the Orchomenian cult and later spread through Greece. At Sparta the Graces were two in number, Kleta (Noise, Fame), and Phaënna (Brightness), and the same number seems original at Athens, where the names were Auxo (Increase) and Hegemone (Queen); later Thallo, originally one of the Horæ (q.v.), was joined with them, and this triad appears in the oath taken by the Athenian ephebi (see EPHEBUS). Their early connection with the bloom of nature was soon obscured by the conception of them as goddesses of the joy of life and beauty, present at the dances and the feasts of the gods and closely joined with Hera, as marriage goddess, and above all with Aphrodite. The legend represented them as daughters of Zeus and Eurynome. In art the triad prevails, and until the end of the fourth century they always appear fully draped. In the third century the growing connection with Aphrodite leads to a change; they now appear slightly draped or wholly nude, and usually embracing one another or clasping hands. To the Romans the Gratiæ were not really deities, but rather artistic abstractions borrowed from the Greeks by poets and others.

Bibliography. Krause, *Musen, Gratien, Horen, und Nymphen* (Halle, 1871); Usener, *Götternamen* (Bonn, 1896); Furtwängler in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1884–86); Preller-Robert, *Griechische Mythologie* (Berlin, 1894); Escher, in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. iii (Stuttgart, 1899), very full references. For the view that there were three Charites at Athens, consult Robert, "De Gratiis Atticis," in *Commentationes in Honorem Mommseni* (Berlin, 1877).

GRACIÁN, grä-thyän′, BALTASAR (1601–1658). A Spanish author, born near Calatayud, Aragon. He was a Jesuit preacher, and he became rector of the College of Tarragona. His works were often published under the name of his brother Lorenzo. *La agudeza, y arte de ingenio* (1642) was a book which had a great vogue in its day and influenced an entire school of followers called Gracianists. Gracián belonged to the cult of Euphuists; his style was obscure and affected, but he was a keen observer and at times a powerful writer. Schopenhauer, who translated Gracián's *Oráculo manual* (Maxims of Conduct) into German, calls his *El criticón* (1650–53) "one of the best books in the world." His other works are: *El héroe* (1630); *El discreto* (1645); *El político Don Fernando el Católico* (1640). Consult Borinski, *Baltasar Gracián und die Hoflitteratur in Deutschland* (Halle, 1894); *Biblioteca de autores españoles*, vol. lxv (Madrid, 1873).

GRACIOSO, grä′thė-ō′sō. A stock comedy character in sixteenth and seventeenth century Spanish drama, similar to the euphuistic and "fantastical" knight of the Elizabethan stage. The type originated with Lope de Vega.

GRACKLE, grăk′′l (from Lat. *graculus*, *gracculus*, jackdaw, onomatopoetic in origin). A kind of bird. 1. In America, a blackbird of the genus *Quiscalus* or the genus *Euphagus* of the family Icteridæ. (See BLACKBIRD.) The best known of those is the purple grackle, or "crow blackbird" (*Quiscalus quiscula*), which is found throughout the United States as far as Dakota and thence northwestward to Alaska. It is about 12 inches long, and the male is uniform glossy black with metallic reflections. A larger species, recently removed from this genus, is the boat-tail (*Megaquiscalus major*), and a Mexican grackle is distinguished by having a disproportionately long tail. Well-known species of the other genus are the widely distributed rusty grackle (*Euphagus carolinus*), 9 inches long, the male dead black; and Brewer's (*Euphagus cyanocephalus*), of the Rocky Mountain region, which is a uniform glossy, greenish black, the head and neck glossy violet black. In all species the females and young are gray or brownish, more or less streaked. These birds have all the characteristics described under Blackbird. See Plate of Blackbirds, and Colored Plate of Eggs of Song Birds.

2. In the Old World the name is given to various birds of the starling family (Sturnidæ) and myna family (Eulabetidæ), of the genera *Acridotheres, Eulabes*, etc. The Linnæan genus *Gracula* is difficult of definition and is passing out of use. Most of the Indian birds called "grackles" are better known as mynas, or hill mynas. See Hill Myna; Myna Bird.

GRADA′TION. A term that has been introduced into geology to describe the work of streams in leveling off an irregular land surface. This work is effected by erosion within the upper reaches of the rivers, where the hilly or mountainous topography gives a rapid flow and thus considerable erosive power to the streams, and by sedimentation along the lower or flood-plain sections, where the velocity is relatively slow. The final result is to produce a flat surface with a gentle slope that is neither being eroded (degraded) nor built up (aggraded) and that is then known as a base-leveled plain. See Erosion; Geology.

GRADE CROSSING. The intersection of a railroad track or right of way with a highway or private road or another railroad. The corresponding phrase in England is "level crossing." It is the duty of a person using the highway or private road at such crossing to exercise due care in looking and listening for approaching trains. What amounts to due care depends largely upon the facts of each case, such as the distance which the traveler can see along the track, the ease with which he can traverse the crossing or retreat from a point of danger, and the signals which are given by the road. On the other hand, the railroad is also bound to exercise due care in warning travelers of the approach of its trains and in attempting to avoid collision with those using the crossing. In the absence of a statute or ordinance requiring gates or guardsmen at crossings, failure to supply them is not negligence on the part of the company. Acts of Parliament require all English railroads to maintain gates at level crossings, with proper persons to open and close them; to slacken speed to 4 miles an hour at such crossings adjoining a station and prohibit shunting at such crossings. It is also their duty to keep level crossings in proper repair and to open gates promptly for travelers. Similar statutes exist in many of the United States. Even though a railroad company fails to do its duty at a grade crossing, it will not generally be liable in damages to a person whose injury is not solely due to such failure, but is due in part to his own carelessness. He is not entitled to recover if his own negligence contributed to the accident. See Negligence; Carrier, Common; Railways, and the authorities there cited.

GRÄDENER, grā′d*e*-nẽr, Hermann (1844–). An Austrian musician, a son of Karl Grädener. He was born at Kiel. After studying with his father he attended the Vienna Conservatory. He taught violin at several music schools of Vienna and in 1899 began to lecture on harmony and counterpoint at the university there. He is also conductor of the Vienna Singakademie. He has written a number of meritorious compositions for orchestra, chamber music, and pianoforte.

GRÄDENER, Karl (1812–83). A German musician, born at Rostock. After studying music under the violoncellist Mattstadt and others, he was engaged at Helsingfors and subsequently at Kiel, where for 10 years he was director of music at the university. From 1851 to 1861 he conducted the singing academy which he had founded at Hamburg. After an association of three years with the Vienna Conservatory he was appointed president of the Tonkünstler-Verein of Hamburg. His excellent choral works include the oratorio *Johannes der Täufer*. His other compositions, which are distinguished by fine harmonic effects, include two symphonies, the overture to *Fiesco*, a pianoforte concerto, and considerable chamber music.

GRADENIGO, grä′då-nē′gō̇, Pietro (1249–1311). Doge of Venice, elected in 1289. Under him the law was passed suppressing election for the recruitment of the Council of Forty and leaving to the aristocracy the choice of its members. Gradenigo was involved in various wars, especially against the Genoese (1294–99), and was uniformly unsuccessful. In 1310 he defeated the conspiracy of the Tiepoli. See Venice.

GRAD′GRIND, Thomas. A thoroughly practical utilitarian in Dickens's *Hard Times*.

GRADISCA, grȧ-dĭs′kȧ. A town of Austria in the coast district of Görz and Gradisca, on the right bank of the Isonzo, near the Italian frontier, about 30 miles northwest of Triest. It has an ancient citadel (now a reformatory), a large silk mill, an emery factory, and large electric works. The old fortifications have been destroyed and replaced by fine squares and promenades. Pop. (town), 1890, 3352; 1900, 3843; (district), 1900, 31,230; 1910, 34,155. Gradisca was the capital of the old County of Gradisca.

GRAD′UAL. 1. In the liturgy of the Roman and other western churches, that portion of the mass which intervenes between the epistle and the gospel and consists of a few verses of the Holy Scriptures, generally taken from the Psalms. It is the oldest and most important of the chants of the mass and represents the singing of Psalms in the early Church. It was originally called the "Responsum," or "Cantus Responsorius"; but, probably for the sake of distinguishing it from other portions of the service called by the same name, its present appellation has been substituted. The name is derived from the place at which this response was chanted, and which was either the ambo, or chanting pulpit, which is approached by steps (*gradus*), or the steps themselves, whether of the ambo or of the altar. Originally, as we find from St. Augustine, the gradual consisted of an entire Psalm, and in the mass of the first Sunday in Lent the entire Ninety-first (Ninetieth in the Vulgate) Psalm is chanted. In the Ambrosian liturgy the gradual is partly from the Old and partly from the New Testament.

The gradual, in the Roman liturgy, is always followed by the "Alleluia," except in penitential time, when a slow and mournful chant, called the "tract," is substituted. In Eastertide, from Easter to Pentecost, it is displaced by "the great Alleluia." 2. The liturgical book which contains the music of the part of the mass sung by the choir. The official editions now current were published at Regensburg by the Congregation of Rites, folio in 1872, octavo in 1877. Consult Atchley, *Ordo Romanus Primus* (London, 1905), and Nikel, *Geschichte der Katholischen Kirchenmusik* (Breslau, 1908).

GRADUAL PSALM, Psalm of the Steps, or Song of Degrees (Heb. *shīr hamma'aloth*, Gk. *ᾠδῆ ἀναβαθμῶν*, *ōdē anabathmōn*, Lat. *canticum graduum*, song of the steps). A name given both by the Hebrews and in the Christian service books to each of the 15 Psalms, cxx–cxxxiv (in the Vulgate cxix–cxxxiii). The origin of the name is uncertain. In rabbinical literature it is traced to a legendary incident connected with the building of the second temple, or explained as an allusion to the 15 steps by which the temple was reached (Ezek. xl. 22 et seq.). These Psalms have been connected either with the "going up" from Babylon to Jerusalem or with the "ascent" of the temple mount. The latter is the more plausible opinion. The Psalms are "pilgrim's songs," and the contents, though reflecting political and religious conditions of various periods, all emphasize the longing of the pious Israelite for Yahwe's temple or express his joy upon beholding it. The composition of the entire series belongs to the post-exilic period of Hebrew literature. They are not the work of a single hand, nor were they produced at a single time, being united simply by the same heading attached to each one. They form a special title, Pilgrim Psalter, the title of which should probably be translated "Songs of Ascent," and which ultimately found a place in the fifth division of the completed Psalter. These Psalms in the Roman Catholic church are recited on each Wednesday in Lent. See Psalms.

GRAD'UA'TION (ML. *graduatio*, from *graduire*, to give a degree, from Lat. *gradus*, degree, step, from *gradi*, to walk). The art of laying off scales of measurements, as the tape, protractor (q.v.), or vernier (q.v.). The simplest problem in graduation is the dividing of a straight line, such as the linear scale, or rule. Standard scales being abundant, it is only necessary to make a careful copy of an original. If the material used is wood or iron, the divisions may be marked off by the use of a dividing square and knife-edge. The dividing square is simply a piece of steel in the form of an L, one arm of which may be moved from one division of the scale to another, while the other arm serves to guide the knife in marking the new scale. The original graduation of linear scales into equal divisions was performed either on the principle of bisection or of "stepping." In the case of bisection, beam or extension compasses (see Compasses) serve to describe an arc from each end of the line to be graduated, so as to locate the bisection point. The two arcs drawn by the compasses cannot be made to touch with sufficient precision for accurate dividing. The small interval between the arcs may be divided by the aid of a microscope and delicate compasses, thus approaching more nearly the bisection point of the original line. In the same way each segment may be divided again, and so on. It is evident that all divisions cannot be effected by bisection; hence such instruments as the diagonal scale (q.v.) are employed. "Stepping" is performed with delicately pointed compasses, which are adjusted as nearly as possible to the length of a required division. Beginning at one end of the line the compasses are turned round each leg alternately until the whole line is stepped off. If the last step falls short of or beyond the end the compasses are adjusted accordingly, and the process is repeated until the desired accuracy is attained. The method of bisection is more accurate in practice and was adopted by Graham (1725), Bird (1767), Ramsden, Troughton (1809), and other eminent instrument makers in original graduation. Curve lines may also be graduated on this principle. Since the chord of an arc of 60° is equal to the radius of the circle, the circumference may be divided into six equal parts with a precision depending only on the delicacy of the instruments. Further division depends upon bisection. The amount of care, patience, skill, and delicacy of touch required in the original graduation of important astronomical instruments is such that comparatively few men have been found competent for the task, and these have been almost as famous as the astronomers who have successfully used the instruments. The necessity of extreme accuracy in graduating a scale will be understood by considering the application that is made of these divisions. The mariner, e.g., determines his latitude by taking the meridian altitude of the sun. For this purpose he uses a sextant, the arc of whose limb corresponds to the curved surface of the globe. Whence the real error in latitude bears the same ratio to an error in the scale that the earth's radius bears to the radius of the arc. If each degree occupied an arc of $\frac{1}{6}$ of an inch, an error of $\frac{1}{100}$ of an inch in a division would thus mislead the mariner to an extent of more than 4 statute miles as regards his position at sea. But a ship's quadrant is a rude instrument compared with astronomical transits for measuring celestial angular distances by means of a divided arc; in these a deviation of a thousandth part of an inch is regarded as a serious error.

The methods of original graduation above described are used only for the largest and most important astronomical or geodetic instruments. Ordinary instruments are graduated by dividing plates or engines which copy and adapt a standard set of divisions. The dividing plate which is used for common purposes, such as dividing compass rings, theodolites, and sextants, is a divided circle with a straightedge, made movable on the axis or arbor of the plate in such a manner that its edge during every part of its revolution shall fall in the exact line from centre to circumference. The ring, protractor, or other instrument to be divided is clamped upon the plate with its centre exactly coinciding with that of the plate, and the straightedge is moved round and made to halt at the required divisions on the circumference of the dividing plate; and by using the steel straightedge as a guide corresponding divisions are marked off upon the concentric arc of the instrument to be divided. The dividing engine is a very complex machine, requiring the greatest accuracy and care in its construction. Among the styles of dividing engines may be mentioned the English types of Ramsden (1777), Troughton (1793), Simms, and Ross, the German types of Reichenbach and the French type of Gambey. A detailed account of these would far exceed the limits of this article. Their principal parts consist of a large toothed circle, graduated with extreme care by original division; a very carefully constructed endless screw works in these teeth and is moved through any given number of revolutions, or any measured fraction of a revolution, by means of a treadle or other suitable power, thus making the requisite steps for each division, another part of the machine cutting a fine line at the moment of the halt of each step. These divisions are cut upon an arc of silver, gold, or platinum, which is soldered or inlaid upon the limb of the instrument, the precious metals being used on account of the oxidation to which common metals are liable.

Bibliography. Bird, *Method of Dividing Astronomical Instruments* (London, 1767); Ramsden, *Description of an Engine for Dividing Mathematical Instruments* (ib., 1777); "Memoir" of Troughton, in *Philosophical Transactions* (ib., 1809); a treatise on dividing scientific instruments, in the *Edinburgh Encyclopædia* (Edinburgh, 1832); Ambronn, *Astronomische Instrumentenkunde* (Leipzig, 1899). For history of efforts at graduation and notes on the modern methods, consult Watkins, "The Ramsden Dividing Engine," in *Smithsonian Report* (Washington, 1890).

GRA'DUS AD PARNAS'SUM (Lat., steps to Parnassus). 1. A name applied to a Latin or Greek dictionary, in which the vowel quantities are marked, and which hence is useful in verse composition. The first Latin Gradus was made in 1702 by the Jesuit Paul Aler; another, in 1850, was compiled by Yonge. In Greek we have a Gradus by the Bishop of Durham (1815) and another by Brasse (1828). 2. The name was also used as the title of a Latin work on composition and counterpoint by J. J. Fux (1725), and of a French work on the art of piano playing by Clementi (1817).

GRA'DY, Henry Woodfin (1851–89). An American journalist and orator. He was born at Athens, Ga., 1851, and after being educated at the University of Georgia at Athens, he began his work as a journalist in a series of letters on the resources of his native State, which attracted much attention. In 1880 he purchased an interest in, and became editor of, the Atlanta *Constitution,* in which position he remained until his death. A public hospital and a monument in Atlanta commemorate his services, which were especially influential on account of the fact that Mr. Grady was one of the first prominent representatives of the New South to express the willingness of that generation and section to throw in their lot with the rest of the nation. For his life, consult Lee (New York, 1896), in which also some of his speeches and articles are included; and, for his speeches, *Complete Orations* (Austin, Tex., 1910), ed. by E. DuB. Shurter.

GRADY, Thomas Francis (1853–1912). An American lawyer and politician, born in New York City. He was educated in the parochial schools and in Manhattan College, studied law, and held several city positions. Soon after joining Tammany Hall he was elected a member of the State Assembly, and in 1881 a member of the State Senate. As a result of his opposition to the measures desired by Grover Cleveland, then Governor of New York, he lost his seat in the Senate. But having supported Cleveland for the presidency in 1888, in the following year he returned to the State Senate. There he was minority leader of the Democrats for 10 years, but was refused the position of majority leader when the Democrats came into power in 1910. Grady was regarded as the foremost orator connected with Tammany Hall. He opposed most of the reform measures advocated while he was in the Legislature.

GRÆÆ, grē'ē (Lat., from Gk. Γραῖαι, *Graiai,* from γραῖα, *graia,* old woman). Dino, Enyo, and Pephredo, daughters of Phorcys and Ceto, thence called Phorcydes. Sisters and guardians of the Gorgons (see Gorgo), they are described by Hesiod (q.v.) as fair-faced, gray-haired from birth, and possessing between them but a single eye and tooth, which they had to use in turn. Perseus (q.v.) craftily stole the eye and the tooth and restored them only when the Grææ instructed him how to procure the articles by aid of which he was to behead Medusa.

GRAEBE, grå'be, Karl (1841–). A German industrial chemist, born in Frankfort-on-the-Main. He was educated in the Karlsruhe technical school and at the universities of Heidelberg, Marburg, and Berlin, and was an assistant of Bunsen and Baeyer, lecturer at Leipzig in 1869, professor at Königsberg in 1870, and from 1878 to his retirement in 1906 at Geneva. In 1868, with Liebermann, he discovered an artificial method (which they, and independently Perkin, later improved and cheapened) of producing alizarin from anthracene—the most important early synthesis of coal-tar products. His technical papers are in Liebig's *Annalen* and the *Berichte* of the Deutsche Chemical Gesellschaft, and his *Untersuchungen über Chinone* were edited in 1911 by Decker.

GRÆCOS'TASIS (Lat., from Gk. Γραικόστασις, *Graikostasis,* Greek place). A raised platform, without a roof, west of the rostra in the forum at Rome. It served as the place of assembly for foreign ambassadors, who there awaited the summons to appear before the Roman Senate. Thence, also, they could witness the assemblies of the people. Consult Connor, "The Græcostasis of the Roman Forum and its Vicinity," in *University of Wisconsin Bulletin,* pp. 159–203 (1904).

GRÆCO-TURKISH WAR OF 1897. See Greece, *History.*

GRAEFE, grā'fe, Albrecht von (1828–70). A German ophthalmologist. He was born in Berlin, where his father, Karl Ferdinand von Graefe, a noted surgeon, held a professorship at the university. Graefe took his medical degree in Berlin in 1847 and then made a special study of ophthalmology in Prague, Vienna, Paris, and London. In 1850 he returned to Berlin and founded there a private hospital for diseases of the eye. By means of his investigations and his success in difficult operations, he soon became recognized as the leading authority in this branch of medical science. He founded in 1855 the *Archiv für Ophthalmologie* and was the author of numerous scientific monographs of great value. In 1857 he was made professor extraordinary, in 1866 ordinary professor, of diseases of the eye. Graefe may be regarded as the founder of modern ophthalmology. The invention of the ophthalmoscope by Helmholtz in 1851 opened up new possibilities to the science, of which Graefe hastened to take advantage. By use of the instrument he improved vastly the methods of cure for glaucoma. He also introduced new operative methods in cases of strabismus, which established a favorable prognosis in many cases which until then had been considered hopeless. Graefe was also considered an authority on diseases of the brain and was the first to recognize the importance of diseases of the eye in the diagnosis of such cases. Consult: Michaelis, *Albrecht von Graefe, sein Leben und Wirken* (Berlin, 1877); Jacobson, *Albrecht von Graefes Verdienste um die neuere Ophthalmologie* (ib., 1885); Alfred Graefe, *Ein Wort zur Erinnerung an Albrecht von Graefe* (Halle, 1870).

GRAEFE, Alfred Karl (1830–99). A German ophthalmologist, cousin of Albrecht von Graefe. He was born at Martinskirchen, studied medicine in various German universities and in Paris, acted as an assistant to Albrecht von Graefe in Berlin from 1854 to 1858, and from 1858 to 1892 was professor of diseases of the eye at Halle. He founded at Halle an ophthalmic hospital which attracted many thousands of patients, and devised a method of operating whereby, without injury to the eye, parasites deeply lodged in that organ could be removed. He wrote a number of papers on ophthalmology and published, in conjunction with Sämisch, *Handbuch der gesammten Augenheilkunde* (1874–80).

GRAESSE, grĕs′se, Johann Georg Theodor (1814–85). A German antiquary and bibliographer, born at Grimma and educated at Leipzig. He was appointed director of the royal numismatic collection at Dresden (1878), from which position he retired in 1882. Graesse's more important writings are: *Lehrbuch einer allgemeinen Litterargeschichte* (1837–59); *Trésor de livres rares et précieux* (1858–69); a translation of the *Gesta Romanorum* (1842); an edition of the *Legenda Aurea* (1846); *Die Sage vom ewigen Juden* (1844); *Die Sage vom Ritter Tannhäuser* (1846); *Beiträge zur Litteratur und Sage des Mittelalters* (1850); *Geschlechts-, Namen- und Wappensagen des Adels deutscher Nation* (1876); *Des deutschen Landmanns Praktika* (1858); the very valuable guide to Latin geographical names, *Orbis Latinus* (1861); the guides and textbooks: *Handbuch der alten Numismatik* (1853); *Guide de l'amateur d'objets d'art et de curiosité* (2d ed., 1877); *Guide de l'amateur de porcelaines et de poteries* (9th ed., by Jännicke, 1901); and *Unsere Vor- und Taufnamen* (1875). In 1878 he began to edit a *Zeitschrift für Museologie.*

GRAETZ, grĕts, Heinrich (1817–91). A prominent Jewish historian, born at Xions, Province of Posen. After an academic course at the universities of Berlin and Jena, where he graduated in 1845, he was for some time a preacher, but, finding himself unsuited for this career, devoted himself to teaching, and became an instructor at the Breslau Seminary in 1854. Here he remained until 1870, when he received a professorship at the University of Breslau. His principal work is the history entitled *Geschichte der Juden von den ältesten Zeiten bis auf die Gegenwart* (11 vols., 1853–75; popular ed., 1888–89). The work is skillfully arranged, and, although somewhat unequal in merit—the first four volumes being the best—it evidences minute research. It has been translated into Hebrew, Russian, French, English, and several other languages, and parts of it have been frequently reprinted.

GRAEVIUS, grȧ′vē-o͞os (originally Gräve, or Greffe), Johann Georg (1632–1703). A distinguished German philologist, born at Naumburg on the Saale, Jan. 29, 1632. He studied law at the University of Leipzig, but while on a visit to Holland was led to abandon jurisprudence for philology. In 1656 he was called to the University of Duisburg and two years later was summoned to Deventer. In 1662 he became professor at Utrecht, teaching at first rhetoric, but later history and political science. There he built up a great reputation and received flattering offers from several universities, all of which he declined. Pupils crowded to his lectures, not only from all Holland, but from all Europe. In Germany particularly the great noblemen sent their sons to be educated by him. He died at Utrecht, Jan. 11, 1703. During his life as a teacher he edited some classical authors, especially some of the works of Cicero, and also, in addition to other writing, compiled two monumental works: *Thesaurus Antiquitatum Romanarum* (12 vols., Utrecht, 1694–99) and *Thesaurus Antiquitatum et Historiarum Italiæ* (9 vols., Leyden, 1704), completed by his pupil and biographer Burman. Consult Burman, *Oratio Funebris* (Utrecht, 1703), which contains a complete list of the works of Grävius, and Sandys, *History of Classical Scholarship*, vol. ii (Cambridge, 1908).

GRAF, gräf (Ger., count). In the early Middle Ages an Imperial or royal officer, like the *comes* of the Roman Empire, whose office gradually developed into an hereditary feudal grade. The word appears in English in its compounds, margrave, or marquis (*markgraf*), landgrave (*landgraf*), and burgrave (*burggraf*), and is used frequently in the simple German form. The graf, in all probability, was originally a fiscal officer, whose duty it was to collect the revenue of a district. The title first appears in the Lex Salica (compiled in the fifth century), under the Latinized form of *grafio;* at a later period the office is often designated by the Latin equivalent *comes.* Charles the Great divided his whole Empire into graf districts (*grafengaue*) or counties, each of which was presided over by a graf. The people were in the habit of appointing a representative called the *centgraf* to attend to their interests with the graf, and probably, if necessary, to appeal from his decisions to the central government. Then there was the *stallgraf,* or stable graf, the *comes stabuli,* or constable of later times; the *pfalzgraf* (*comes palatii*), who presided in the domestic court of the monarch, which was the highest court in the realm; the *sendgraf,* who was sent as an extraordinary deputy of the King to control the ordinary *gaugrafen;* and lastly, the *markgraf,* or marquis, on whom the important duty of defending the borderlands devolved. Consult Waitz, *Deutsche Verfassungsgeschichte* (Berlin, 1874–85), and Brunner, *Deutsche Rechtsgeschichte,* vol. ii (Leipzig, 1892).

GRAF, Arturo (1848–1913). An Italian poet and critic of German extraction, born at Athens and educated at the University of Naples. After lecturing at the University of Rome for several years, he was appointed to the chair of Italian literature at the University of Turin (1882). His publications include voluminous treatises on the history of art and literature, and the following poetic works: *Versi* (1874); *Poesie e novelle* (1876); *Medusa* (3d ed., 1890); *Dopo il tramonto, Versi* (1893); *Morgana* (1901); *Poemetti drammatici* (1905). Sadness and a spirit of pessimism, combined, however, with a strong faith in science, are prevailing features of the poetry of Graf, who occupied a high rank among the recent poets of Italy. His critical writings are valuable, as, e.g., *A traverso il cinquecento.* He was one of the founders of the *Giornale storico della leturatura italiana.*

GRÄF, grȧf, Gustav (1821–95). A German historical and portrait painter. He was born at Königsberg and studied with Hildebrandt and Schadow at Düsseldorf (1843–46). He then supplemented his studies in Antwerp, Paris, Munich, and Italy, and in 1852 settled in Berlin, where his first important work was the mural painting "Subjugation of Wittekind by Charlemagne," after Kaulbach's design, in the cupola saloon of the New Museum. Among several historical genre scenes of sterling technique which followed, the "Patriotism of Ferdinand von Schmettau, 1813" (1863, National Gallery, Berlin), deserves especial mention. He next devoted himself with great success to painting portraits, among the best of which are those of Field Marshal von Roon (1882, National Gallery, Berlin), Du Bois-Reymond (1886), and Robert Koch (1891). In 1868–70 he executed the fresco paintings, impersonating "Jurisprudence" (Solon), "Art" (Phidias), and "Eloquence" (Demosthenes), in the aula of the University at Königsberg. His more recent works include: "Prometheus and the Oceanids" (1886, Königsberg Museum); "Viking's Death" (1892); "Will o' the Wisp" (1893). He was professor and member of the Berlin Academy.

GRAF, gräf, Karl Heinrich (1815–69). A German Orientalist, born at Mülhausen in Alsace. He was educated in the school and college of his native place and then at the gymnasium and Protestant Seminary of Strassburg (1830–32) and in the university of that city. He devoted himself to Old Testament exegesis and Eastern linguistics under Bruck and Russ and studied later under Fleischer at Leipzig. In 1849 he became professor of French and Hebrew at Meissen. He retired in 1868. His biblical criticism was independent and liberal. He wrote: *Der Segen Moses, Deuter. 33* (1857); *Der Prophet Jeremia erklärt* (1862); *Die geschichtlichen Bücher des alten Testaments* (1866). But his work in Persian, especially on the poet Sadi, is better known and more important. It includes: *Moslicheddin Sadis Rosengarten . . . übersetzt mit Anmerkungen* (1846); *Sadis Lustgarten* (1850); *Sadi: le Boustan, texte persan avec un commentaire persan* (1858); "Die Moral des Sadi," in Reuss and Cunitz, *Beiträge zu den theologischen Wissenschaften* (1851); and editions and translations of quatrains, distichs, elegies, and ghazals of Sadi in vols. ix, xiii, xv, and xviii of the *Zeitschrift der deutschen morgenländischen Gesellschaft.* Consult Cheyne, *Founders of Old Testament Criticism* (London, 1893).

GRÄFE, grȧ′fe, Karl Ferdinand von (1787–1840). A German surgeon. He was born at Warsaw, studied medicine and surgery at Halle and Leipzig, became professor of surgery and director of the surgical clinic at Berlin in 1811, and during Napoleon's Prussian campaign superintended the military hospitals. During the war he became in 1813 a surgeon general on the staff of the King of Prussia, and professor and finally (1822) vice director in the Academy of Medicine and Surgery at Berlin. He was the founder of the surgical clinic and the polyclinic at Berlin, where his investigations and discoveries won for him a world-wide reputation. He was particularly well known for his autoplastic operations, in which he applied new methods and made use of new instruments of his own invention, which revolutionized the existing method of treatment. Among his numerous published works are: *Rhinoplastik* (1818); *Die epidemisch-contagiose Augenblennorrhöe Aegyptens in den europäischen Befreiungsheeren* (1823), and the *Jahresberichte über das klinische chirurgisch-augenärztliche Institut* (Berlin, 1817–34). With Ph. von Walther he edited the *Journal für Chirurgie und Augenheilkunde.*

GRÄFENBERG, grȧ′fen-bĕrk. A village in Austrian Silesia, 37 miles west-northwest of Troppau. It is celebrated as the place where the water cure was introduced in 1826 by Priessnitz. It is annually visited by many hundreds of patients. Pop., 1100.

GRAFENBERG, grä′fen-bĕrk, Wirnt von. See Wirnt von Grafenberg.

GRAFF, gräf, Anton (1736–1813). A German portrait painter. He was born at Winterthur, Switzerland, and studied with Schellenberg in his native city. About 1776 he removed to Augsburg, then to Ansbach as assistant to the court painter Schneider. On his return to Augsburg he was associated with the line engraver Bause, a lifelong friendship which exercised great influence on his art. He practiced also at Munich and Ratisbon and in 1766 was called to Dresden as court painter and member of the Academy, becoming professor in 1789. Although he practiced also in Berlin and at Leipzig, Dresden remained his home. He painted many historical pieces and many copies of the old masters, but his portraits alone have permanent value. For he was the most prominent portraitist of the *Sturm und Drang* period in Germany, and depicted, with absolute fidelity to nature, the great men of his day—Lessing, Schiller, Wieland, Herder, Bürger, Gillert, Hörner, Gluck, Moses Mendelssohn, and the rest. His treatment is simple and unaffected, clear and plastic; the technique adroit and powerful. He is best represented in the galleries of Dresden with 23 pictures, and Leipzig with 13; also by good portraits in the galleries of Winterthur, Berlin, Weimar, and other German cities. See Plate of Schiller. Consult the monographs by Muther (Leipzig, 1881); Vogel, with 60 plates (ib., 1898); Waser, 40 plates (ib., 1903).

GRAFF, Eberhard Gottlieb (1780–1841). A German philologist. He was born at Elbing, Prussia, and was educated at Königsberg, where he became professor of the German language in 1824. A pupil of Jacob Grimm and Lachmann, he followed in the footsteps of these eminent scholars and produced several philological works distinguished by careful research, such as his valuable contribution to Old High German, entitled *Althochdeutscher Sprachschatz* (6 vols., 1834–42); *Diutiska: Denkmäler deutscher Sprache und Literatur aus alten Handschriften* 1826–29); *Die althochdeutschen Präpositionen* (3 vols., 1824), besides numerous editions of Old German texts.

GRAFF, Frederic (1775–1847). An American hydraulic engineer, born in Philadelphia. He learned the trade of a carpenter and later became a skillful draftsman. He was an assistant to H. B. Latrobe in the construction of the first Philadelphia water works, becoming chief engineer and superintendent of the system in 1805.

Subsequently he planned and constructed the new city water works at Fairmount Park, introducing iron pipes and fire plugs and stopcocks of his own invention. The success of this system won for him a wide reputation, and he was a consulting engineer in the execution and expansion of similar works at New York, Boston, and numerous other cities. He remained in the service of the city of Philadelphia for 42 years. In 1885 he was president of the American Society of Civil Engineers.

GRAFF DE PANCSOVA, gräf de pän′chȯ-vȧ, Ludwig (1851–). A Hungarian zoölogist, born in Pancsova. He was educated at Vienna, Graz, and Strassburg; was lecturer at Munich, professor at Aschaffenburg, and then professor at Graz. His important works, particularly on the planarians, include: *Das Genus Myzostoma, Monographie der Turbellarien* (1882–90); *Organization der Turbellaria Acoela* (1891); *Zoologie seit Darwin* (1896); *Parasitismus im Tierreich* (1907). He edited the valuable *Arbeiten aus der zoologischen Institut zu Graz.* Graff received honorary degrees from Cambridge and St. Andrews universities.

GRAFFENRIED, grä′fen-rēt, Christopher, Baron de (?–1735). A Swiss nobleman, who established a colony of Swiss and Germans in North Carolina. In 1709 the Lords Proprietors of Carolina granted to him 10,000 acres on the Neuse and Cape Fear rivers, and soon afterward a large number of Palatines and Swiss followed him to the confluence of the Trent and Neuse, where they founded a town which they called New Bern in his honor—Bern, Switzerland, having been his birthplace. While he and Lawson, the surveyor-general of the province, were exploring the Neuse River in 1711, they were captured by the Tuscarora Indians, who had become incensed at the encroachments of the colonists, and Lawson was soon put to death, though Graffenried, after many weeks, was allowed to return on condition that no settlements should be made without the sanction of the native chiefs. Graffenried soon afterward sold his possessions in North America and returned to Switzerland.

GRAFFIGNY, gräf′fē̇′nyē̇′, Françoise d'Issembourg d'Happoncourt de (1695–1758). A French author, born at Nancy. She was married when young to François Hugues de Graffigny, chamberlain to the Duke of Lorraine, from whom she obtained a separation. In 1738 she spent an unhappy few months with Madame du Châtelet, the friend of Voltaire, where she was accused of having stolen a copy of *La Pucelle.* She published her first novel in 1740, but it was not until her *Lettres d'une Péruvienne* (1747) appeared that she became famous in the society of her time. Her salon was a literary centre of Paris. In 1750 her drama *Cénie* was played with great success, but another comedy, *La fille d'Aristide* (1758), failed completely, and this, says the Abbé de Voisenon, hastened her death. Her complete works were published in 1788, and her letters (which give a most minute account of Voltaire's life at Cirey) under the title *Vie privée de Voltaire et de Madame du Châtelet,* in 1820 (reëdited with a biography, 1879). Consult Guerle, *Madame de Graffigny* (Nancy, 1882).

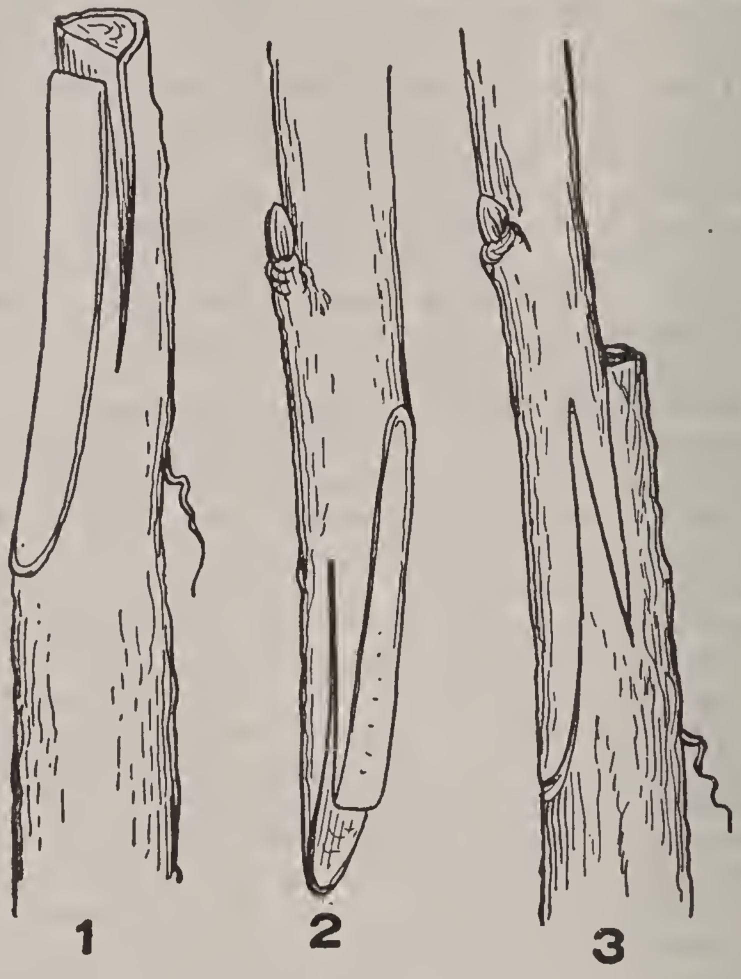
GRAFFITI, grȧf-fē′tē̇ (It., writings, scribblings). An interesting and important class of ancient inscriptions. The graffito is a rude casual scribbling or scratching on the plaster of a wall, a pillar, or a doorpost. Such scribblings are pretty commonly found on the substructions of Roman ruins, as in the golden house of Nero, and the palace of the Cæsars on the Palatine, and in still greater numbers in Pompeii and in the Roman catacombs. Their literary value, of course, is very slight; but, as illustrating the character and the habits of a certain class of the ancient Romans, and what may be called the "street life" of the classic period, they richly deserve study. They are also valuable for the light they throw on the forms of the alphabet in daily use, and the vulgarisms and the corruptions existing in the speech of the common people. The graffiti of Pompeii are far the most numerous and important, forming upward of one-half the inscriptions from that place. A few are in Greek, many in Oscan, but most of them are Latin. They include nominations to office, advertisements, caricatures, single names, words of greeting or abuse; but the favorite subject of the scribblers was love, often in verse, quoted, adapted, or original. Ovid and Propertius were favorites with the writers of graffiti at Pompeii. Lines of Vergil, too, appear. Some of the graffiti at Pompeii deal with the gladiatorial shows, giving rude drawings of kinds of gladiators, etc. That such scribblings were felt to be a nuisance is shown by an inscription found at Rome begging persons not to scribble on the walls. Of the Roman graffiti, the most famous is the one found on the Palatine, showing a man worshiping a cross on which is suspended a figure with the head of an ass; a Greek inscription says it is Alexamenus worshiping his god. Consult: Lanciani, *Ancient Rome in the Light of Recent Discoveries* (Boston, 1889); Kraus, *Das Spottcrucifix vom Palatin* (Freiburg, 1872); Wünsch, *Sethianische Verfluchungstafeln* (Leipzig, 1898). The interpretation of the scene as a parody of the Crucifixion, though generally accepted, is not certain; it is possibly the confession of Alexamenus of his membership in the Gnostic sect which worshiped Typhon-Set. The graffiti of Pompeii are collected by Garucci, in *Graffiti de Pompéi* (2d ed., Paris, 1856). Consult also Fiorelli, *Monumenta Epigraphica Pompeiana I* (Naples, 1854–56; 2d ed., giving the Oscan inscriptions, 1856); *Corpus Inscriptionum Latinarum,* vol. iv (Berlin, 1871; in 1909, 13 vols. of a new edition had been issued and 4 vols. of supplement); Mau-Kelsey, *Pompeii: Its Life and Art* (2d ed., New York, 1902); Thomas, *Roman Life under the Cæsars* (ib., 1899); Abbott, *Society and Politics in Ancient Rome* (ib., 1909). The later discoveries are scattered through periodicals or uncollected. For Rome, consult Correra, "Graffiti di Roma," in *Bollettino della commissione municipale archeologica* (Rome, 1893 et seq.).

GRAFLY, grā′flĭ, Charles (1862–). An American sculptor. He was born in Philadelphia and studied at the Pennsylvania Academy of Fine Arts under Thomas Eakins and later in Paris under Chapu and Dampt. Upon his return to America he settled in his native city, where his strong and thoughtful work earned for him a high rank in his profession. His modeling is firm and sure, without any attempts at bravura and with strict suppression of all unnecessary details and finish. A portrait bust of his is always marked by serious research into character, and no American sculptor has allowed his fancy as free a rein in imaginative works, often of mystic or allegorical significance. Such a work was the strange "Fountain of Man," at the Pan-American Exposition, Buffalo (1901); and many of the small ideal bronzes, like the "Symbol of Life," for which he is famous. Grafly was elected a member (vice president, 1914) of the National Sculpture Society, of the National Academy of Design (1908), and of the National Institute of Arts and Letters. Among his many awards are the gold medal of the Pennsylvania Academy of Fine Arts and of the expositions of Paris (1900), Buffalo (1901), and Charleston (1902), and the George D. Widener gold medal (1913). Among his works in public collections are: "Mauvais Présage," in the Detroit Museum; "Vulture of War," and a powerful decorative figure, "Truth," in the St. Louis Museum; "England" and "France," on the New York Custom House; a bust of Dædalus and a beautiful nude, "In Much Learning," Pennsylvania Academy; and the General Reynolds Smith Memorial, Philadelphia. Consult Taft, *History of American Sculpture* (New York, 1903).

GRAFSTRÖM, gräf′strẽm, ANDERS ABRAHAM (1790–1870). A Swedish poet, born at Sundsvall. His poems won him the special prize from the Swedish Academy in 1825. Many of his songs are very popular and have been set to music by Nordblom. They were originally published in the journals of the day, but have been collected under the title *Samlade skaldestycken* (2 vols., 1864).

GRAFT HYBRIDS. It has long been known that the character of the stock influences to some extent the vigor and development of the scion, and it has also been supposed that new shoots from buds produced from the tissues at the point of union of stock and scion may be intermediate between the two and result in a *graft hybrid.* Several rather famous graft hybrids have been reported, such as the Bizzaria orange and *Cytisus adami,* the latter from a scion of *C. purpureus* on *C. laburnum;* but closer examination has shown that neither is a true hybrid, but a more imperfect combination of the original species in which there has been no fusion of cells. Remarkable results have also been obtained from the union of the tomato (*Solanum lycopersicum*) and the nightshade (*S. nigrum*), plants that have proved excellent for such experiments. Most of the unions resulted in imperfect blendings, or *chimæras* (q.v.), but in a few instances a fusion of the cell contents seems to have taken place and true graft hybrids to have resulted. One such hybrid has been named *Solanum darwinianum.* See CHIMÆRA, IN PLANTS; HYBRIDITY.

GRAFT′ING (from OF. *graffe,* a sort of pencil; slip for grafting resembling a pointed pencil in shape, from Lat. *graphium,* from Gk. γραφεῖον, *grapheion,* pencil, graving chisel, from γράφειν, *graphein,* to write). The operation by which the cut surfaces of two branches or roots, either from two different plants or from the same plant, are caused to grow together. The portion used to perpetuate its kind is usually of the present or past season's growth and is called a scion. The portion into which the scion is inserted is termed the stock, and usually carries roots or is a part of a root, although in rare cases unrooted cuttings are used as stocks. The art of grafting has been practiced from prehistoric times. The success of the process depends entirely upon the ability of plants to heal wounds. When two wounded (cut) surfaces are so adjusted that the cambium layer of one coincides at any point with the cambium layer of the other, union by granulation of the two surfaces may take place, connection between the conduction vessels of stock and scion becomes established (see CONDUCTION), and new growth begins. The great value of grafting consists in the ease and comparative certainty with which cultural varieties can be increased without serious loss of type characters. Were all forms of the art of grafting to be lost to the horticulturist, commercial tree-fruit growing in its high state of perfection would decay with the orchards existing at the time.

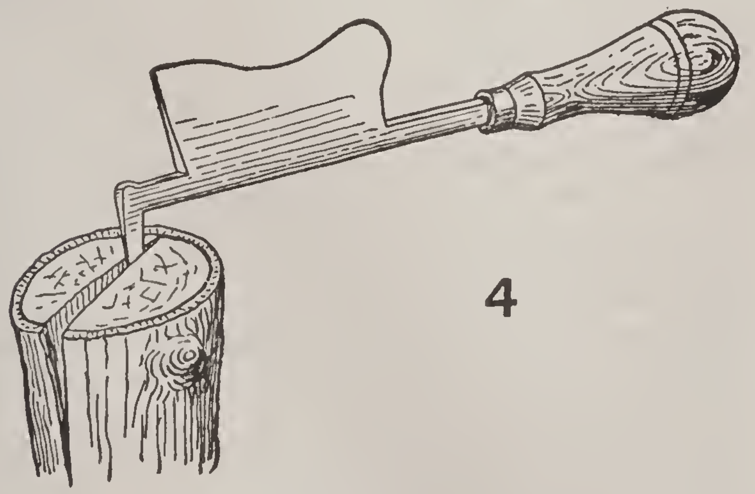


WHIP GRAFTING.
1, stock; 2, scion; 3, stock and scion adjusted.

All horticultural varieties or sorts of fruits that belong to the pome, the drupe, or the citrus classes are now multiplied almost wholly by graftage, which includes both budding and grafting. This art and that of cuttage are the foundations of the entire superstructure of tree-fruit growing. The progress in plant breeding and the great rapidity with which new sorts are now disseminated have been largely, and with tree fruits almost wholly, attained by the aid of graftage and cuttage. Graftage permits the originator of a new sort of apples, e.g., to disseminate the variety with the minimum of risk that it will depart from the type, thus avoiding the difficulty, nay, almost impossibility, of reproducing the type from seed. The method of reproducing the sort does not enter as a factor in his efforts to secure a desired variation. Besides being used for reproduction true to type, grafting is used to hasten or to increase fruitfulness; to replace undesirable varieties by desirable ones; to reduce the size of plants by working them on a smaller-growing species of stock, e.g., the pear upon the quince; to overcome the effects of injuries, as in the case of trunk girdling by mice or rabbits. The wood for scions, like that for hardwood cuttings, must be taken while in a resting condition. The time usually considered best is after the leaves have fallen, but before severe freezing begins in early winter. The scions are then tied in branches and buried in moist soil or sand, where they will not freeze, but will be kept cold enough to prevent swelling of the buds. Good results often follow the cutting of scions in the spring, just before or at the time the grafting is to be done.

The two most popular methods of grafting are the whip and the cleft. For *whip grafting* of roots the scions should be cut in the autumn, because spring cutting allows insufficient time for the union of the two surfaces before growth starts. This style of grafting is the one most extensively used in root grafting. It is well suited to young plants or parts of plants used as stock, and to indoor work during the comparative leisure of winter. Both the stock and the scion are cut diagonally and smoothly with a sharp knife, leaving about an inch of cut surface across which, in both stock and scion, a slit is made parallel with the direction of growth, as shown in Figs. 1 and 2. The one object to secure is the juxtaposition of the cambium layers of stock and scion. This may be accomplished by having the bark of the stock coincide with or cross the bark of the scion at a slight angle. After the scion and stock have been joined as in Fig. 3, they should be wrapped with several turns of cotton soaked in grafting wax, in order that the parts may be held firmly together. The root or stock may be left any convenient length, from 2½ to 6 inches, and the scion cut accordingly. This cutting, however, is usually done before the joining of the two pieces. In general, the shorter the root, the longer the scion, and vice versa. The practices of the more rigorous climates tend to short-piece roots and long scions. The resulting trees, being set deeply, soon send out roots from the scion and become "own rooted," in which case they are believed to be superior to trees that obtain their nourishment solely through the foster roots of a stock. No experiments have been conducted to settle this matter, but common experience is more in favor of the short root deeply set than the reverse. At planting time root grafts thus made should be covered, only the topmost bud of the scion being left above the soil. If the graft is to be exposed, it should be covered with waxed muslin or with hard wax. When deeply planted, either in a furrow or with a dibble, the waxed cotton will be ample protection.

Cleft grafting is particularly adapted to large trees, when the variety is to be changed. Branches too large to be worked by other methods may be cleft grafted. But, as a rule, the larger the branch, the less satisfactory will be the result. A branch 1 or 1½ inches in diameter is severed with a sharp saw. The stub is then split with a thin chisel or with the grafting implement shown in Fig. 4 and held open with a wedge or the prong of the grafting tool until the scion shaped as shown in Fig. 5, is inserted, and adjusted, as shown in Fig. 6. The scion should consist of a portion of the previous season's growth of the variety to be propagated and should be long enough to have two or three buds. In general, it is a good plan to cut the scion so that the basal or proximal bud shall be at the base of the opening of the triangle formed in cutting the scion into the wedge shape necessary in this style of graft. In addition to the advantage of having the proximal bud located as above described, the wedge of the scion should be made thicker on the side to face outward when the scion is in position. The advantage of this is that pressure is brought upon the outer growing parts of both scion and stock, whereas, were the scion thicker on the inner side, the conditions would be reversed, and the death of the scion would follow. The importance of having an intimate connection between the growing tissues of both scion and stock cannot be too strongly emphasized, for upon this alone the success of grafting depends. To make this contact of the growing portions doubly certain, the scion is often set at a slight angle with the stock into which it is inserted, in order to cause the growing portions of the two to cross.



4

OPENING SLIT WITH GRAFTING CHISEL.

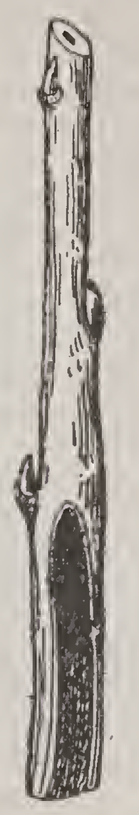


Fig. 5. GRAFTING.

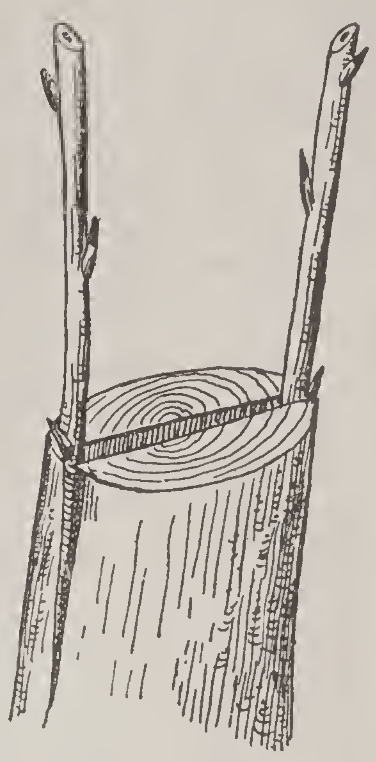


Fig. 6. GRAFTING.

Inarching, or *Grafting by Approach*, is the process of grafting two branches without detaching either from the parent plant. Suitable wounds having been made in both stock and scion, the cut surfaces are brought in contact, fastened and covered with grafting wax or other material to exclude the air. After the tissues have united, the stock above and the scion below the point of contact are cut away. This style of grafting is used to correct defects in trees by uniting the arms of Y crotches with a brace of living wood to prevent their splitting apart, twigs from each arm being twisted together and so fastened until they have united. Inarching is also used with herbaceous plants that do not readily unite by other methods; potted specimens are usually employed in this latter case. The method is the only one found in nature.

Waxing, which is quite as important as a proper adjustment of the scions, consists in covering all cut or exposed surfaces with grafting wax, grafting clay, or some noncorrosive substance which will exclude air and moisture. The wax may be applied hot, with a brush, but the safest plan is to spread it with the hand while it is warm enough to be worked. In warm climates a soft wax is not desirable for exposed work. It may be used in whip grafting, but in cleft grafting, where all wounded surfaces are exposed to the weather, a hard wax, made by melting together five pounds of resin, two and a half pounds of beeswax, and one-half pound of tallow or one-half pint of linseed oil is preferable. In addition to these two styles of grafting, there are others in common use, among which are veneer, saddle, and bud grafting. Some of these are adapted to both herbaceous and woody plants. Consult: Bailey, *The Nursery Book* (New York, 1896); id., *Cyclopedia of American Horticulture* (ib., 1900–02); Fuller, *Propagation of Plants* (ib., 1894). See BUDDING.

GRAFTING, IN GYNÆCOLOGY. In 1904–05 grafting of ovarian tissue from one woman into another proved successful. Thyroids have been successfully implanted into the abdomen, also suprarenal glands. Grafting glands from animal to man appears to be possible, though thus far it has failed to give permanent physiological results. See RHINOPLASTIC OPERATION; SKIN GRAFTING.

GRAF'TON. A city and river port of Clarence Co., New South Wales, Australia, situated on both sides of the Clarence River, which is navigable for moderate-sized vessels to the sea, 45 miles distant (Map: Australasia, H 5). It is the terminus of a branch railway from Brisbane, 150 miles to the north; has coal, gold, silver, and copper mining industries. It is the seat of an Anglican and a Roman Catholic bishop, and both denominations have built fine cathedrals. The town is the centre of a prosperous district engaged in sugar growing, dairying, and horse breeding for the Indian market. Pop., 1901, 4174; 1910, 4681.

GRAFTON. A town, including several villages, in Worcester Co., Mass., 6 miles southeast of Worcester, on the Boston and Albany and the New York, New Haven, and Hartford railroads (Map: Massachusetts, D 4). It has a public library and manufactures cotton goods, shoes, emery, thread, and boxes. A settlement of "praying Indians" was established here in 1660 by John Eliot, in 1728 white settlers came, and in 1735 the town of Grafton was incorporated. The government is administered by annual town meetings. Pop., 1900, 4869; 1910, 5705. Consult Pierce, *History of Grafton* (Worcester, 1879).

GRAFTON. A city and the county seat of Walsh Co., N. Dak., 40 miles north by west of Grand Forks, on the Great Northern and the Northern Pacific railroads and on the Park River (Map: North Dakota, G 2). The centre of a productive wheat region, it has several grain elevators, flour mills, a creamery, machine shops, etc. Grafton contains the State Institute for the Feeble-Minded, a hospital, and a Carnegie library. The water works and electric-light plant are owned by the city. Pop., 1900, 2378; 1910, 2229.

GRAFTON. A city and the county seat of Taylor Co., W. Va., 99 miles southeast of Wheeling, on the Baltimore and Ohio Railroad and on the Tygart's Valley River (Map: West Virginia, E 2). There is a national cemetery here with 1261 graves, 620 of unknown dead; and the State Reform School is 2 miles to the west, at Pruntytown. The city is an important railroad centre, the terminus of four divisions of the Baltimore and Ohio Railroad, and has railroad shops, flour and planing mills, foundries and machine shops, cigar, glass, and pottery plants, wholesale grocery and drug houses, etc. Grafton was established in 1854 as a railroad centre and in 1899 received a city charter. It adopted the commission form of government in 1914. The water works and street-lighting plant are owned by the city. Pop., 1900, 5650; 1910, 7563.

GRAFTON, AUGUSTUS HENRY FITZROY, third DUKE OF (1735–1811). An English politician. He was educated at Westminster School and, under Stonehewer, Gray's friend, at Peterhouse, Cambridge. In 1756 he was elected to Parliament and in the following year succeeded his grandfather as Duke, and was made Lord Lieutenant of Suffolk. Seven years later Bute dismissed him from his post, and Grafton, allying himself with Lord Temple, attacked Bute sharply. In 1765 he was made Secretary of State for the Northern Department, under Rockingham, but retired in the following year and forced the resignation of his colleagues and the formation of a new ministry under Pitt, in which Grafton became head of the Treasury. But Pitt retired in 1768, and Grafton became actual head, where he had been first only in name. In 1770 he resigned, urged by a difference with his old friend Pitt. A year later he became Lord Privy Seal in North's cabinet in the hope, if we are to believe his own account, of bringing the quarrel with the Colonies to a peaceable end. He retired from this office in 1775 to enter it again in 1782, but left public life on the downfall of the Rockingham ministry in 1783. He was estranged from orthodox beliefs, became a Unitarian, and wrote *Hints Submitted to the Serious Attention of the Clergy* (1789) and *The Serious Reflections of a Rational Christian from 1788 to 1797* (1797). He refused the degree of LL.D. from Cambridge, because it entailed subscription to the Thirty-nine Articles. Consult: *Autobiography and Political Correspondence of Augustus Henry, Third Duke of Grafton* (London, 1898) and extracts from his Memoirs (manuscript) in Campbell's *Lives of the Chancellors* (new ed., 10 vols., New York, 1874–75); Stanhope's *History of England* (5th ed., 2 vols., London, 1889); Walpole's *Memoirs of George III* (4 vols., ib., 1894).

GRAFTON, HENRY FITZROY, first DUKE OF (1663–90). An English sailor, second son of Charles II and Lady Castlemaine. At the age of nine he was married to Isabella Bennett, five years old, and the heiress of the Earldom of Arlington. In the same year he was made Earl of Euston and three years afterward became Duke of Grafton. He entered the navy in 1680, was captain of the *Grafton* in 1683, and campaigned with the French at the siege of Luxemburg. He was Lord High Constable at the coronation of James, served against Monmouth, and escorted D'Adda, the papal nuncio, on his entry to London, but later grew disaffected towards his uncle and was suspected of conspiring with Churchill (the future Duke of Marlborough) against him. He joined William at Axminster and was one of the first to take the oath of allegiance to him. Subsequently he took service with Churchill in Ireland and was killed while leading the attack on Cork. He was a typical sailor and was greatly loved and lamented. He was succeeded by his son Charles (1683–1757).

GRAFTON, Richard (died ?1572). An English printer and chronicler. With Edward Whitechurch, Grafton had a revision of Coverdale's Bible, under the editorship of Thomas Matthews, printed, probably at Antwerp, in 1537 and again in 1538 at Paris. The latter is the first book with Grafton's name. He was connected with Whitechurch in the printing of the Great Bible in France and in England (1539 and 1540) and of a New Testament in English from Erasmus' Greek text (1540). Two years later *The Order of the Great Turcke's Court* and Erasmus' *Apophthegms* appeared from Grafton's press; in 1544 he received a patent for printing liturgies, in 1545 a monopoly for printing Latin and English primers, and became printer to Prince Edward both before and after his accession, printing the first edition of the *Book of Common Prayer* (1549). Printer for Lady Jane Grey, he lost office under Queen Mary, but sat in Parliament in 1553, 1556, and 1562. As a chronicler, he first revised and printed Hardyng's *Chronicle* (1543); later (1548) he printed Hall's *Union of the Two Noble and Illustrious Families of Lancastre and Yorke;* and after he had retired from business wrote an *Abridgement of the Chronicles of England* (1562) and *Chronicle at large and meere Historye of the Affaires of Englande* (1568).

GRAGAS, grä′gȧs (Icel., gray goose). A name given to several private collections of Icelandic law and legend under the Commonwealth and suggested by the similar epithet, *Gullfjödhr* (gold feather), applied to the old Norwegian code. The *Gragas* are principally made up of the *Konungsbok* and the *Stadharholsbok*, the first of which has been ascribed to the eleventh-century historian Ari.

GRAGNANO, grȧ-nyä′nō̇. A city in the Province of Naples, Italy, 3 miles east of Castellamare (Map: Italy, G 2). It is well known for red wine and macaroni. Pop. (commune), 1901, 14,099; 1911, 14,642.

GRAHAM, grā′am. A town and the county seat of Alamance Co., N. C., 23 miles east of Greensboro, on the Southern Railway (Map: North Carolina, C 1). Its most important industries are cotton and overall manufacturing, lumbering, and canning. Settled in 1852, the town is governed by a mayor and board of commissioners. Pop., 1900, 2052; 1910, 2504.

GRAHAM, Catharine Macaulay. See Macaulay, Catharine.

GRAHAM, grā′am, Charles Kinnaird (1824–89). An American civil engineer and soldier. He was born in New York City, entered the United States navy as a midshipman in 1841, and served in the Mexican War. Later he studied engineering and was for several years after 1857 constructing engineer of the Brooklyn Navy Yard. At the outbreak of the Civil War he entered the Army of the Potomac as major of the so-called "Excelsior Brigade," and in November, 1862, he was raised from the rank of colonel to that of brigadier general. He was severely wounded in the battle of Gettysburg and upon his recovery was assigned by General Butler to the command of a gunboat flotilla on the James River. In March, 1865, he was brevetted major general of volunteers. After the close of the war he returned to New York and resumed the practice of his profession. From 1878 to 1883 he was surveyor of the port in New York.

GRAHAM, Dougal (1724–79). The dwarf chapbook writer and bellman of Glasgow, born near Stirling. He joined Prince Charles's army in 1745 as sutler and was present at the battle of Culloden. In 1746 he published an account of the Rebellion in a kind of doggerel. About 1770 he became the bellman of Glasgow. His chapbooks are very rare. They are not in any sense literary, but have a certain coarse humor and are interesting as a chronicle of the common events of the town. A complete edition of his writings, with a biographical introduction, was edited by George MacGregor (1883).

GRAHAM, George Perry (1859–). A Canadian journalist and statesman. He was born at Eganville, Ontario, and was educated at the Morrisburg Collegiate Institute. After 1880 he was for 12 years editor of the Morrisburg *Herald*, in 1892 he was appointed assistant editor of the Ottawa *Free Press*, and afterward for 14 years he was managing editor of the Brockville *Recorder*. He was a Liberal member of the Ontario Legislature in 1898–1907; in 1904–05 was Provincial Secretary in the administration of Sir George William Ross (q.v.); in 1907 became leader of the Liberal Opposition in the Ontario Legislature, but resigned and was elected to the House of Commons; and in August of the same year was appointed Minister of Railways and Canals in the administration of Sir Wilfrid Laurier. Upon the defeat of that administration in 1911 he retired from office and resumed editorial charge of the Brockville *Recorder*. Later he was reëlected to the House of Commons.

GRAHAM, George Rex (1813–94). An American journalist, born in Philadelphia. In 1832 he apprenticed himself to a cabinetmaker in that city. While working at this business, he studied law and in 1839 was admitted to the bar. He had also found time to write a series of articles for the Philadelphia papers, and these led to his becoming editor of the *Saturday Evening Post*, a position he retained until 1846. Afterward he became editor of *Atkinson's Casket*, *Graham's Magazine*, and the *Philadelphia North American*, in all of which he was financially interested. Unfortunate stock speculations swept away most of his fortune, however, and he was compelled to support himself by writing until in 1887 cataracts on both eyes forced him to retire. He was operated on successfully, but from that time until his death did no active work.

GRAHAM, Sir Gerald (1831–99). An English soldier. He was born at Acton, Middlesex, June 27, 1831, and after studying at Wimbledon and Dresden he was admitted (1847) to the Royal Military Academy at Woolwich and completed his training in the School of Military Engineering at Chatham. He served in the Crimean War, participating in the battle of the Alma, at Inkerman, and in the siege of Sebastopol, where by his intrepidity he became the central figure in the assault on the Redan (June 18, 1855). During the campaign in China he again displayed great courage and skill and, although seriously wounded in the storming of the Taku forts (Aug. 21, 1860), subsequently entered Peking with the victors. Following his return to England in 1861, he was for 16 years commanding engineer successively at Brighton, Aldershot, Montreal, Chatham, Manchester, and York. In 1877 he was appointed assistant director of works for barracks at the War Office. In 1882 he accompanied Sir Garnet Wolseley to Egypt as brigadier general, and his forces had a great share in the victorious campaign against Arabi Pasha. In 1884 he took the field against Osman Digna, whose army he defeated at El-Teb and Tamai. In the meantime he had urged a plan for the assistance of Gordon, which, however, was not accepted. Graham was made a G.C.B. in 1896, and a colonel commandant of the Corps of Royal Engineers in 1899. He died Dec. 17, 1899. He published a number of scientific papers and a contribution to the *Fortnightly Review*, entitled "Last Words with Gordon" (1887), and prepared a translation of Goetze's *Operations of the German Engineers and Technical Troops during the Franco-German War of 1870–71* (1875). Consult Vetch, *Life, Letters, and Diaries of Lieut.-General Sir Gerald Graham* (Edinburgh, 1901).

GRAHAM, Harry (1874–). An English author, educated at Eton and Sandhurst. He entered the Coldstream Guards in 1895, was aid-de-camp to the Earl of Minto, Governor-General of Canada, in 1898, served in South Africa in 1901–02, and was private secretary to Lord Rosebery in 1904–06. Under the pseudonym "Col. D. Streamer" (from the Coldstream Guards) he wrote *Ruthless Rhymes for Heartless Homes* (1899), which made him famous as a master of a cold-blooded, rather American than English, humor. Over his own name he wrote: *Misrepresentative Men* (1904), *Verse and Worse* (1906), *Misrepresentative Women* (1906), *Deportmental Ditties* (1909), *The Perfect Gentleman* (1912), *The Motley Muse* (1913), and other good light verse; and the serious volumes *The Mother of Parliaments* (1910), an account of British parliamentary practice, and *Splendid Failures* (1913), a series of biographical sketches.

GRAHAM, Sir Hugh (1848–). A Canadian journalist. He was born in Huntingdon, Province of Quebec, and was educated at the Huntingdon Academy. He early removed to Montreal and began newspaper work, becoming editor and publisher successively of the *Commercial Advertiser* and *Evening Telegram* of that city. In 1869 he founded the Montreal *Star*, which became a successful and influential independent newspaper. Graham was strongly interested in municipal and political reform as well as in humanitarian projects. He helped to found the Good Government Association of Montreal. In 1910 he was elected vice president of the Institute of Journalists, London, England; and in 1909 he was a delegate to, and chairman of, the Canadian section of the Imperial Press Conference in London. In 1908 he was knighted.

GRAHAM, Isabella Marshall (1742–1814). An American philanthropist, born in Lanarkshire, Scotland. She married John Graham, a British army surgeon, in 1765, and after his death at Antigua in 1774, returned to Scotland and taught for a number of years. In 1789 she came to New York and opened a girls' school. The philanthropic work she had begun in her own country was there continued on a larger scale. She organized a number of charitable societies, and the first Sunday school for ignorant adults. Consult Mason, *Memoir of Isabella Graham* (New York, 1816).

GRAHAM, James. Fifth Earl and first Marquis of Montrose. See Montrose.

GRAHAM, James Duncan (1799–1865). An American soldier and engineer, born in Prince William Co., Va., and educated at West Point. He entered the army as third lieutenant of artillery and served as adjutant at the Military Academy until 1819, when he went with Major Long on his trip through the West. After seven years' service in the topographical department, he was assistant topographical engineer (1829–38); then was promoted to be major and appointed to settle the line between Mexico and the United States. He surveyed the northeastern boundary in 1840 and was principal astronomer on the commission to fix the northwestern boundary. He became colonel of engineers in 1863 and spent his last years in coast survey.

GRAHAM, Sir James Robert George (1792–1861). An English statesman. The eldest son of Sir James, the first Baronet, and of Lady Catharine Stewart, eldest daughter of John, seventh Earl of Galloway, he was born at Netherby, Cumberland, June 1, 1792. He was educated at Westminster School and in 1810 entered Christ Church, Oxford. At 21 years of age he became private secretary to Lord Montgomerie, the British Minister to Sicily; and the entire management of the mission devolved upon him during the most critical period of the war, in consequence of the illness of his chief. On the arrival of Lord William Bentinck he retained his position and afterward accepted a military situation attached to the person of Lord William, who was commander in chief in the Mediterranean. In this capacity at Naples he negotiated the armistice with Murat which separated that general from Napoleon. In 1818 he was returned for Hull on Whig principles, but in 1820 lost his seat. In 1824 he succeeded to the baronetcy on the death of his father. In 1826 he published an important pamphlet entitled *Corn and Currency*, and after a successful canvass in which he strenuously advocated the removal of religious disabilities, the repeal of the Corn Laws, and parliamentary reform, he was returned to Parliament from Carlisle. In 1830 he became First Lord of the Admiralty, with a seat in the cabinet, and was one of the committee appointed to discuss and settle the provisions of the first Reform Bill. In 1834 he seceded from the government with Mr. Stanley, on the appropriation clause of the Irish Church Temporalities Act. In 1838 he was elected lord rector of the University of Glasgow. In 1841 he became Secretary of State for the Home Department in the government of Sir Robert Peel, who on one occasion declared that Graham was the ablest administrator and the best man of business he had ever known. In 1844 a warrant issued for opening the letters of Mazzini, and the communication of their contents to the Austrian Minister involved Graham in great obloquy. He also incurred displeasure by his high-handed dealing with the Scottish church troubles which ended in the formation of the Free church. He gave Peel warm support in carrying the Corn Law Repeal Bill and resigned office with his chief as soon as that measure was carried. On the death of Peel, in 1850, he became leader of the Peelite party in the Lower House and led the opposition to the Ecclesiastical Bill. From December, 1852, he held his old office of First Lord of the Admiralty in the coalition ministry of the Earl of Aberdeen, until his retirement in February, 1855. He died from heart disease, Oct. 25, 1861. His commanding stature, fine personal presence, ripe wisdom, and calm and impressive eloquence made him the Nestor of the House of Commons. But his changes of opinion, from the whiggism of his youth to the conservatism of his manhood and the radicalism of his old age, exposed him to well-founded charges of political inconsistency. Consult Parker, *Life and Letters of Sir James Graham* (London, 1907).

GRAHAM, John, Viscount Dundee (?1648–89), oftenest spoken of as Claverhouse. The eldest son of Sir William Graham of Claverhouse, head of the branch of the noble family of Montrose in Forfarshire. He entered St. Andrews University in 1665 and served in the French army from 1668 till 1672. He then entered the Dutch service as cornet in the Prince of Orange's horse guards and at the battle of Seneffe (1674) rescued the Prince when in great danger of being either killed or taken prisoner. Returning to Scotland, he obtained (1678) an appointment as lieutenant in a troop of horse commanded by his cousin, the third Marquis of Montrose. At this time the government of Charles II was engaged in an attempt to force Episcopacy upon the people of Scotland. A system of fines and military coercion had been carried on for years against all nonconformists; conventicles and field preachings were prohibited, and penalties were inflicted on all who harbored the recusants. When the people resisted this oppression, many were put to death, the jail was filled with captives, and those who fled were outlawed, and their property was seized. It was now Graham's duty to repress the Covenanters in the south of Scotland. In this work he was continually baffled, and was even put to flight by a body of armed Covenanters at Drumclog. Finally, however, as commander of the cavalry, he aided the Duke of Monmouth in defeating them at Bothwell Bridge, June 22, 1679. The victors killed 400 rebels and captured 1200, who were afterward treated with atrocious cruelty. In these encounters Graham showed no marked ability; but in pursuing, detecting, and hunting down unyielding Covenanters he evinced the utmost zeal. He rose to the rank of major general, was appointed to the Privy Council of Scotland (1683), and in 1688, on the eve of the Revolution, James II raised him to the peerage as Viscount Dundee and Lord Graham of Claverhouse. After this monarch had fallen, Dundee remained faithful to him. Joined by the Jacobite Highland clans and by auxiliaries from Ireland, he raised the standard of rebellion against the government of William and Mary. With 2500 foot and a troop of horse he defeated General Mackay at the pass of Killiecrankie, July, 27, 1689. Dundee was shot while waving on one of his battalions to advance. He was carried off the field to Urrard House, or Blair Castle, and there expired.

The character and services of Dundee have been greatly exaggerated and blackened by party spirit. With the Jacobites he was the brave and handsome cavalier, the last of the great Scots and gallant Grahams. He was upright and virtuous in private life and in military discipline remarkably severe. With the Covenanters he was "wicked-witted, bloodthirsty Claver'se." As a military commander, he had little opportunity for display, yet the battle of Killiecrankie was skillfully planned and fought with courage and dash. As a persecutor, he was severe, but not wholly without pity. Consult: Graham, *Letters with Illustrative Documents*, ed. by Smythe (Edinburgh, 1526); Napier, *Memorials and Letters Illustrative of the Life and Times of John Graham of Claverhouse* (ib., 1859–62); A Southern (pseud.), *Clavers, the Despot's Champion: A Scot's Biography* (London, 1889); Morris, "Claverhouse," in Lang, *English Worthies* (ib., 1887); *Acta Parl. Scot. IX* (appendix); *Memoirs of the Lord Viscount Dundee*, ed. by Jenner (ib., 1903); Ian Maclaren, *Graham of Claverhouse* (New York, 1907); Terry, *John Graham of Claverhouse* (London, 1905); Barrington, *Grahame of Claverhouse* (London, 1911). Scott's novel *Old Mortality* gives a spirited picture of Claverhouse.

GRAHAM, Peter (1836–). A Scottish landscape and animal painter. He was born in Edinburgh, where he studied under Lauder and Ballantyne; afterward he removed to London, and became an R.A. in 1881. He is noted for his spirited studies of Highland scenery with cattle, such as "Highland Spate" (1866) and "Moorland Rovers," and for finely rendered sea pictures, distinguished for atmospheric effect and sincerity of treatment, such as "Our Northern Wall," "The Fowler's Crag," and "Where Deep Seas Moan." His powerful yet delicate art expresses, as has no other, the poetic melancholy of Highland scenery. He is represented in the Tate Gallery, London, by "A Rainy Day," in several British provincial galleries, and especially at Melbourne and Sydney, Australia.

GRAHAM, Richard, Viscount Preston (1648–95). See Preston.

GRAHAM, Stephen (1884–). An English writer on Russia, son of P. Anderson Graham, editor of *Country Life*. He left London in his youth and went to Russia, lived among Russian peasants in different parts of the Empire, traveled with them to Jerusalem and to America, and wrote such illuminating volumes as *A Vagabond in the Caucasus* (1911), *Undiscovered Russia* (1912), *Changing Russia* (1913), and *With the Russian Pilgrims to Jerusalem* (1913).

GRAHAM, Sylvester (1794–1851). An American reformer, best known as a temperance lecturer and an advocate of vegetarianism. He was born at Suffield, Conn., studied at Amherst, and in 1826 entered the ministry of the Presbyterian church. A few years later he became a temperance advocate and based his cure for alcoholism upon proposed radical reforms in diet, his theory being that a vegetable diet is incompatible with a craving for stimulants. In particular, therefore, he urged an entire abstinence from meat and an improvement in the making of bread. Graham bread has become a settled name for the article made of unbolted wheat flour and strongly recommended by him. He published: *Graham Lectures on the Science of Human Life* (1839); *Bread and Bread-Making; A Lecture to Young Men on Chastity*; and part of a projected work on *The Philosophy of Sacred History*.

GRAHAM, Thomas. See Lynedoch, Thomas Graham, Lord.

GRAHAM, Thomas (1805–69). An English chemist, born in Glasgow. Having studied at Glasgow and Edinburgh, he became, in 1830, professor of chemistry at Anderson's College, Glasgow, and continued in that office till 1837, when he succeeded Dr. Turner in the chemical chair of University College, London. In 1855 he was appointed master of the mint and resigned his professorship. Graham is best known for his researches on the diffusion of gases and of substances in solution. His experiments, carried out with the aid of very simple apparatus, furnished valuable data, which have proved of great importance in the development of the modern theory of solutions. In studying solutions he found that the velocity of diffusion varies with the substance in solution and depends to a great extent on the temperature at which the liquid is kept. He found that amorphous substances like albumen, gum arabic, silicic acid, ferric hydroxide, etc., which he designated by the term *colloids,* diffuse very slowly and are incapable of passing through parchment paper or animal membranes, while substances like sugar, the mineral acids and their salts, etc., which he termed *crystalloids,* diffuse more or less rapidly and pass freely through membranes. He was thus led to the discovery of the analytical method known as *dialysis.* To separate by this method a crystalloid from a colloid, the solution containing both is placed in a suitable vessel and is separated from a volume of pure water usually by parchment paper. Part of the crystalloid then passes out of the solution into the pure water, while the colloid is stopped by the membrane. If the water, now containing some of the crystalloid, is replaced by a new quantity of pure water, some more of the crystalloid diffuses out of the solution containing the mixture. By repeating the operation several times, a solution is finally obtained which contains practically nothing but the pure colloid. Concerning the interdiffusion of gases, Graham showed that the velocity of diffusion of a gas is inversely proportional to the square root of its density. He also studied the rates of *effusion* of gases through a very fine hole in a disk, and the rates of *transpiration* of gases through capillary tubes. Graham carried out numerous other classical researches in chemistry, including investigations of the acids of phosphorus, the constitution of sulphates and oxalates, etc. His researches were published in the form of original memoirs, comprising in all 63 papers on various subjects. In addition to these memoirs he brought out an excellent treatise on chemistry, which passed through several editions and was republished in this country and translated into German. He also edited the *Chemical Reports* and *Memoirs* of the Cavendish Society in 1848. Graham was the first president of the Chemical and the Cavendish societies, was a fellow of the Royal Society, and an honorary member of many foreign scientific bodies. See DIFFUSION; COLLOIDS; CHEMISTRY.

GRAHAM, SIR WILLIAM (1826–1907). A British naval officer. He entered the navy in 1842 and served on the southeast coast of America, gaining distinction by boarding a slave brig from an open boat and capturing its crew. In 1851 he served on the west coast of Africa, where he took part in the destruction of Lagos; in 1854 he served in the Baltic and Gulf of Bothnia and shared in the capture of Kertch; and in 1857 he commanded a gunboat in the war with China. He then served in the West Indies in 1868–71, commanded the *Britannia* in 1874–77, and, becoming rear admiral in 1879, he was admiral superintendent of the Malta Dockyard in 1881–85. He was appointed comptroller of the navy and a member of the Board of Admiralty in 1885, and from 1888 to 1891, when he retired, he was president of the Naval College at Greenwich. He became full admiral in 1890 and was knighted in 1902.

GRAHAM, WILLIAM ALEXANDER (1804–75). An American politician. He was born in Lincoln Co., N. C., graduated at the University of North Carolina in 1824, and was admitted to the bar soon afterward. He was a member of the North Carolina State House of Commons in 1833–40 and was Speaker of that body in 1838 and 1840. In 1840–43 he was a member of the United States Senate, and he was elected Governor of his State by the Whigs in 1845 and again in 1847. Under President Fillmore he was Secretary of the Navy from July, 1850, until March, 1853, and as such organized Commodore Perry's expedition to Japan. When General Scott ran for President in 1852, Graham was on the ticket as candidate for Vice President. He was again member of his State's Lower House in 1854–55 and of the State Senate in 1861–64, and he was a Senator in the second Confederate Congress in 1865.

GRAHAM BREAD. See BREAD; GRAHAM, SYLVESTER.

GRAHAME, grā′am *or* grām, JAMES (1765–1811). A Scottish poet. He was born in Glasgow, was educated at the university of that city, and removed to Edinburgh in 1784, where he studied and practiced law. Finding the legal profession unsuited to his tastes, he afterward took orders in the Church of England and was successively curate of Shipton in Gloucestershire and of Sedgefield in the County of Durham. He left several poetic works, the chief of which is *The Sabbath* (1804), a poem admired by Scott for its feeling for nature, and scoffed at by Byron in his *English Bards and Scotch Reviewers.* Grahame also published: *Poems on the Abolition of the Slave Trade* (1804); a pamphlet, *The Birds of Scotland* (1806); *British Georgics* (1809).

GRAHAME, grā′am *or* grām, JAMES (1790–1842). A Scottish historian. He was born at Glasgow, was educated at St. John's, Cambridge, practiced law for some years, and then devoted his time to the preparation of his *History of the Rise and Progress of the United States of North America* (4 vols., 1836). The work passed through several editions (the edition of 1845 containing a *Memoir* by Josiah Quincy) and was pronounced by Prescott to be the best work before Bancroft's. Bancroft's criticisms of Grahame were answered by Quincy in a pamphlet published in 1846, *The Memory of the Late James Grahame Vindicated from the Charges of Mr. Bancroft* (Boston, 1846). Grahame also denounced slavery in *Who is to Blame? or Cursory Review of the American Apology for American Accession to Negro Slavery* (1842).

GRAHAME, KENNETH (1859–). A Scottish author (born in Edinburgh, and educated in England) whose ability was first recognized by the *Scots Observer* in the nineties. His *Pagan Papers* (1893), in which he appears as an exponent, in essay form, of the joy of living and as a skillful and felicitous phrase maker, found a fit audience; but it was his *The Golden Age* (1895), in part composed of papers from the earlier volume, that established his reputation. The latter book is made from memories of his own boyhood and is alive and vocal with an engaging troop of clever, mischief-making, and imaginative youngsters whose pranks and adventures are seen with the eyes of an amiable man of the world, in whom irony, tenderness, and a quantum of poetry and romance contrive to coexist harmoniously. In 1898 appeared his *Dream Days.* This was followed 10 years later by *The Wind in the Willows,* a fantasy, grotesque, humorous, and touched with poetry, in which animals—a simple-hearted mole, a water rat of singular sensibility, and a boastful toad in the pride of his motor car—all of them with very human qualities and defects, are satirically presented to the entertainment of the reader. This author is of the few successful writers of the day whom a good reception has not seduced into careless overproduction. Grace, charm, finish, a choiceness of diction, and other stylistic qualities evince his sense of responsibility to an exacting literary conscience.

GRAHAME-WHITE, CLAUDE (1879–). An English aviator and builder of aëroplanes, educated at Bedford Grammar School and at Crondall House College. He engaged in the making of motors in London and later organized an aviation school at Pau. He made several notable flights with a Farman biplane in 1910 and in the same year toured America, won the Gordon Bennett trophy with a Gnome-Bleriot monoplane, making 100 kilometers in 1 hour 4 minutes and 3 seconds, and started an aëroplane works and aviation school at the London Aërodrome, Hendon. Besides his special articles on aviation, he published: *The Aëroplane, Past, Present, and Future* (1911), with Harry Harper; *The Story of the Aëroplane* (1911); *Heroes of the Air: A Book for Boys* (1912); *The Aëroplane in War* (1912).

GRAHAMITE, grā′*a*m-īt (named in honor of J. Lorimer Graham, of New York, and Colonel Graham, of Baltimore). A pitch-black, solid bitumen, having a hardness of 2 and a specific gravity of 1.145. It is slightly soluble in alcohol, partly so in ether, and almost completely in turpentine and carbon disulphide. It was originally found in Wood and Ritchie counties, W. Va., where it occupies more or less vertical veins or fissures that traverse carboniferous rocks and evidently lead down to the oil pool found below it. An analysis showed: C, 76.45; H, 7.83; N, trace; O, 13.46; S, trace; Ash, 0.10. The deposit is exhausted. It is said to have been found in Colorado, Texas, and Mexico, but these occurrences may represent some of the other types of solid bitumens. Its origin is supposed to have been through oxidization of petroleum. It is used for making varnishes and insulators. See ASPHALTIC COAL.

GRAHAM LAND. Part of the east coast of a supposed promontory of the so-called Antarctic Continent which lies to the southward of South America (Map: The World, in Vol. i, Q 15). It extends south of lat. 63° S., the meridian of long. 60° W. cutting a part of the coast. The extension of the promontory to the south is not yet determined. In 1832 John Biscoe, the master of a British sealer, while trying to avoid the storms that prevail around Cape Horn, took a course so far south that he accidentally discovered this land. To that portion of this territory which has been seen by various explorers, various names have been given. The Norwegian sealer Larsen sailed along the east coast in 1894 and named the northeast coast region King Oscar II Land, and the southern portion, which he saw from his vessel, Foyn Land. His most southern point (at sea) is lat 68° 10′ S. The Belgian Antarctic expedition of 1897–99 discovered what they believed to be the northwest terminus of the mainland and named it Danco Land. The Swedish expedition under the command of Otto Nordenskjöld spent two years in Graham Land (1901–03), wintering on the east coast. On his sledge journey south Nordenskjöld was prevented by an ice wall like that of Victoria Land from passing beyond the 66th parallel, but he was the first to bring information of the interior. He discovered that Louis Philippe Land is an island, found a wide water channel extending north to the west of Mount Haddington, and brought home numerous fossils of Tertiary age similar to those found in Tierra del Fuego. Charcot (French) in 1904–05 corrected the coast surveys of the northwest coast and determined the position of the islands with reference to Adelaide Island. He returned in 1909 and found that Loubet Land is continuous with Graham Land. Argentina established a meteorological station on the west coast.

Bibliography. Gerlache, *Quinze mois dans l'Antarctique* (Paris, 1902); "Resultats du voyage du S. Y. 'Belgica,'" in *Rapports scientifiques* (10 vols., Antwerp, 1901–05); Charcot, *Le français au pôle sud* (Paris, 1906). See ANTARCTIC REGION.

GRAHAM'S DYKE. A popular name in England for the remains of the Roman wall in the south of Scotland. See ROMAN WALL.

GRAHAMSTOWN, grā′*a*mz-toun. See THAMES.

GRAHAM'S TOWN. A city of South Africa, the administrative centre of the eastern portion of the Cape Province. It lies 43 miles northwest of Port Alfred, with which it is connected by rail, as it is also with Port Elizabeth, 106 miles to the southwest (Map: Cape of Good Hope, H 9). It is the seat of an Anglican and a Roman Catholic bishop and is one of the most important educational centres in South Africa. It contains Rhodes University College, St. Andrew's College, St. Aidan's College, a flourishing Jesuit school, and various other denominational institutions. It is the centre of a rich agricultural district and a famous market for ostrich feathers, while it has a small textile industry. Graham's Town is considered one of the pleasantest places of residence in South Africa; the town is well built, the streets broad and shady, and the climate notably healthful. Pop., 1904, 13,887; 1911, 15,000, of whom less than 10,000 were whites. Graham's Town was founded as a military post in 1812 and takes its name from the commander of the local forces, Col. John Graham (1778–1821).

GRAIAI. See GRÆÆ.

GRAIL, grāl, THE HOLY (from OF. *graal, greäl,* Prov. *grazal,* Catalonian *gresal,* LL. *gratalis, gradalis,* from ML. *cratella,* bowl). The spelling varies greatly in the old manuscripts, but in modern usage the most common English forms are *grail* and *graal.* The Grail had a history, which in the fully developed romance ran somewhat in this wise: It was the dish from which Christ ate at the Last Supper. Joseph of Arimathea, wishing to preserve something which belonged to Christ, took it from the table and afterward collected in it the blood from the body of Christ, either while the body was on the cross or after it had been taken down. The vessel was brought to England by Josephes, a son of Joseph, or by Brons, Joseph's brother-in-law.

It was handed down from generation to generation. It possessed many mystic properties—feeding those that were, like Joseph, without sin; multiplying a few loaves of bread, so that they sufficed for 500 people; blinding from its effulgence all, except the pure, who looked upon it, or striking dumb those who came into its presence. It was also identified with the cup of the Last Supper, and more or less vaguely with Christ Himself. The Grail seems to have first appeared in romance united with the story of Perceval. Living with his mother in seclusion far from the court, the boy Perceval is kept in ignorance of chivalry. One day he meets by chance several knights and is fascinated by the splendor of their armor, taking them for angels. Setting out as knight errant, he comes to the castle of the Fisher King, who lies speechless. Before the King passes a bleeding spear and a sacred vessel, concerning which Perceval fails to ask questions. Had he, a pure man, spoken, the King would have been healed. After many wanderings Perceval returns to the Grail castle, welds together a broken sword, and becomes King. The story is worked out with many details, which often differ from those here given. Later the legend assumed a very different form. It was connected with the Arthurian cycle, and Galahad was given the leading rôle in the quest. Many knights from Arthur's court go on the adventure; but the Grail is seen only by Galahad, Perceval, and Bors, who follow it to the Far East. Galahad's soul is borne up to heaven by a great multitude of angels, Perceval dies in a hermitage, and Bors returns to Britain.

Though there are many unsolved problems connected with the growth of the Grail legend, its development seems to have been somewhat as follows: Chrestien de Troyes, a French trouvère (q.v.), left at his death an incomplete poem known as "Perceval," or "Le Conte del Graal," which was continued by other hands. This vast compilation of over 60,000 verses came into existence between 1180 and 1240. In the continuations of the romance the adventures of Gauvain fill as much space as do those of Perceval. On the same source as this romance, Wolfram von Eschenbach, a poet of south Germany, founded his *Parzival* (about 1215), one of the finest poems on the legend. According to this version the Grail is a precious stone which came from heaven after the fall of the angels. It is guarded by a chaste order of knights whom it chooses. Other early Grail romances are a trilogy by the French poet Robert de Boron, known as "Joseph d'Arimathie"; "Merlin"; "Perceval" (at the close of the twelfth century), in which the Grail legend is attached to the Arthurian cycle; *Queste del Saint Graal* (about 1210), a prose romance, in which Perceval is displaced by Galahad, who is thought to be son of Lancelot; *Grand Saint Graal* (about 1220), also in prose; the prose *Perceval le Gallois* (about 1225); the *Mabinogi of Peredur* (i.e., Perceval), a Welsh prose romance (in the thirteenth century); and "Sir Perceval of Galles," an English poem (about 1440). Of the second poem, by Boron, only fragments are extant; and the third, in its original form, is lost, though its matter may be inferred from the prose romance known as the *Didot Perceval* (second quarter of the thirteenth century). Sir Thomas Malory embodied the *Quest*, of which Galahad is the hero, in his *Morte d'Arthur*, printed by Caxton in 1485. From this brief summary the Grail legend is seen to be the work mostly of French poets in the twelfth and thirteenth centuries. On what did they build? It is generally held that much of the matter—e.g., the hero and the magic vessel—was originally Celtic. Of this there is no reasonable doubt. And yet the precise nature of this Celtic contribution to the legend has not yet been determined. The romance of the Grail, so popular in the Middle Ages, was revived by the poets of the nineteenth century. Best known is Tennyson's poem in the *Idylls of the King*. Tennyson, following Malory, gives the Galahad version and of course infuses into the legend modern ideas. On the other version Wagner founded the great music drama of *Parsifal*. Consult: Paris, *La littérature française au moyen âge* (2d ed., Paris, 1890); Hucher, *Le Saint Graal* (ib., 1875–79); Birch-Hirschfeld, *Die Sage vom Gral* (Leipzig, 1877), Hagen, *Der Gral* (Strassburg, 1900); Nutt, *Studies on the Legend of the Holy Grail* (London, 1888 and 1902); Rhys, *Studies in the Arthurian Legend* (ib., 1891); Heinzel, *Ueber die französischen Gral-Romane* (Vienna, 1891); Newell, *King Arthur and the Table Round* (Boston, 1897); *The Legend of the Holy Grail and the Perceval of Crestien of Troyes* (Cambridge, 1902); Furnivall, *The History of the Holy Grail*, Eng. trans. of Herry Lonelich (c.1450) from the French prose (c.1180–1200) of Sires Robiers de Borron (5 parts, Cambridge, 1877–1905—part v of this work contains the *Legend of the Holy Grail: its Sources, Character and Development*, by Dorothy Kempe); Staerk, *Ueber den Ursprung der Grallegende; ein Beitrag zur christlichen Mythologie* (Tübingen, 1903); Wechssler, *Die Sage vom heiligen Gral* (Halle, 1898); Sterzenbach, *Ursprung und Entwicklung der Sage vom heiligen Gral* (Münster, 1908); Sommer, *Messire Robert de Borron und der Verfasser des Didot-Perceval; ein Beitrag zur Kritik der Graal-Romane* (Halle, 1908); Iselin, *Der morgenländische Ursprung der grallegende aus orientalischen Quellen erschlossen* (ib., 1909); Baist, *Parseval und der Gral* (Freiburg, 1909); Weston, *Legend of Sir Perceval* (London, 1906). See GALAHAD; PERCEVAL.

GRAIN. See CARYOPSIS; FRUIT.

GRAIN (OF. *grain*, *grein*, Fr. *grain*, from Lat. *granum*, grain, ultimately connected with Eng. *corn*). A measure of weight derived originally from the use of natural seeds of plants for units of weight on account of their uniformity and general availability. This unit has survived in the Anglo-Saxon weights, the avoirdupois pound being composed of 7000 grains and the troy pound 5760. See WEIGHTS AND MEASURES.

GRAIN ELEVATOR. A structure for the handling, storage, or cleaning of grain during or preparatory to its transshipment by rail or water. In exterior appearance the modern grain elevator often is a tall, windowless, rectangular structure, surmounted by a cupola-like superstructure, or it may be formed of one or more cylindrical or other-shaped units, several of which are united in a common group. The cylindrical form for the bins especially finds application when the elevator is made of steel or reenforced concrete, as under modern conditions. There are two main classes of elevators—one where the storage bins are combined in the same buildings as the main elevator or working house, and those where the working house containing the elevating machinery is distinct from the storage bins, which are in one or more independent structures connected by conveying machinery. The working house is usually a rectangular building with square or circular bins, while the storage bins when independent are usually cylindrical. The simplest elevator is, of course, the country elevator, located along the tracks of some railway, where the farmers drive their loaded wagons onto a dump first to be weighed, after which the grain is passed into a hopper, and the wagon weighed empty. The grain passes into the boot of the elevator leg, where a belt with buckets scoops up the grain and carries it to conveyor belts for distribution to the various bins. The grain is first cleaned and then is elevated into a shipping scale hopper to determine its weight before it is loaded by gravity to the cars from the bins.

In the usual type of elevator the main body of the building (house) is mostly occupied with bins for the storage of grain, while the surmounting structure, which is generally three stories high and is called a cupola, contains the operating machinery and working rooms. Generally the topmost story of the cupola contains the leg-driving machinery and turnhead spouts, the middle story the garners, and the lowest story the weighing hoppers and cleaning machinery. Below the cupola and main roof, and extending over the entire width and length of the house, is the distributing, or spout, floor. Here are the conveyors, for transporting lengthwise to the building, and the distributing spouts, for transferring by gravity the grain from the scale hopper to the bins. By means of legs reaching from the bottom of pits sunk below the foundations of the bins to the topmost story of the cupola, and continuous bucket conveyors, the grain is elevated to the turnhead points and discharged into the garners. From these it passes to the lower floor, where it is weighed, cleaned if desired, and finally spouted to its proper bin. This description applies in general to all elevators, but the construction and arrangement of details differ for different classes of elevators. The mode of operation of a grain elevator at a railroad terminal, described without technicalities, is somewhat as follows: A string of cars is placed so that each car is opposite one of a number of hoppers near the receiving elevator legs located about a car length apart. The track may enter the building underneath the bins or may pass along one or both sides of the building. Two shovelers enter each car and handle each a shovel operated by a rope from a power-shovel shaft in the elevator. These shovels discharge into the hopper or pits into which the feet of the elevator legs descend. From these the bucket conveyors running inside the legs hoist the grain to the topmost story of the cupola, where it is discharged, in turning over a head pulley, into the hopper of the turnhead spouts, thence into the garners, and thence into the weighing hoppers. From the scale hoppers the grain is spouted (1) upon belt conveyors running longitudinally across the building and discharging over movable trippers into storage bins (storage elevators); (2) into car spouts, for reloading or transferring (railway transfer elevators); (3) directly into storage bins, which may be (*a*) shipping bins with dock spouts, to be loaded into vessels; (*b*) car spouts (terminal elevators); or (*c*) garners above cleaning machinery (cleaning elevators). All of these classes of elevators are designed for taking grain from railway cars and transferring it to vessels or to other railway cars.

Marine elevators, for transferring grain from vessels to railway cars, are provided on the dock or water side with elevator legs outside of the house, which are mounted on wheels, permitting movement along the side of the house and allowing the legs to be set opposite the vessel's hatches. These marine legs convey the grain to the turnhead spouts, whence it passes to the garners, scales, cleaning machinery, if desired, or to the car-loading spouts. Elevators are also constructed especially for export handling of grain, as those at New York, Philadelphia, and Montreal, where grain received from cars or inland vessels is stored or transferred to ocean vessels. Such an elevator is the enormous 2,622,000-bushel concrete elevator No. 2 of the harbor commissioners of Montreal, Canada. Floating elevators are structures similar to land elevators, which are mounted on floats or barges, which permit the transportation of the structure from one point of a harbor to another and the transfer of cargoes of grain to vessels at their own berths or anchorages.

In America the most common construction for elevators was timber, and this is now found extensively used in small country elevators, but for larger structures steel, concrete, tile, and brick are employed on account of being fireproof as well as for greater strength. Wooden elevators were constructed sometimes with thin brick outside protecting walls for the house, and corrugated iron covering for the roof and cupola walls. This outside protection, however, was of little practical value once fire had gained access to the timber interior, and even with its use insurance rates were very high. Modern construction usually takes the form of steel bins inclosed by a house with brick walls, and a cupola built entirely of steel framing, covered with terra cotta or iron, and having tile or sheet-steel floors, or sometimes the bins are made of concrete, with a reënforcement; elevators of this construction, used extensively in Europe, have found wide application in the United States and Canada, as their cost is less than steel bins. See illustration under CONCRETE.

Another type of fireproof elevator construction considerably practiced in America consists in building the storage bins of steel separated from the fireproof buildings containing the operating machinery. A system of pneumatic conveyors for handling the grain between the bins and the operating house and for loading and unloading it is an essential part of this type of elevator and may be arranged either in the blast system, the suction system, or the combined blast and suction system. At Emden, Germany, a floating pneumatic elevator and grain-discharging plant is in operation for the transfer of grain from large steamers.

As an indication of the character and extent of the elevator business, reference may be made to the records of grain handled by the elevators of Chicago, Ill. In 1914 the elevator warehouses, declared regular warehouses for the storage of grain under the rules of the board of trade of the city of Chicago, had a capacity of 17,730,000 bushels, while others not so designated had a capacity of 27,645,000, or a total of 45,375,000 bushels. At these elevators the rules provide that, on all grain and flaxseed received in bulk and in good condition, the charge shall not be in excess of one cent per bushel for the first 10 days or part thereof, and one-thirtieth of one cent per bushel for each additional day thereafter, so long as such grain or flaxseed remains in good condition. The largest "regular" elevator in Chicago was the Armour Elevator, including Houses A and B and B Annex, with a capacity of 5,000,000 bushels, while of the others the Union Elevator and Annex had a capacity of 2,000,000 bushels. The total amount of grain received at Chicago in 1913 was 337,488,000 bushels, including wheat, corn, oats, rye, and barley.

Consult: Ketchum, *Walls, Bins and Grain Elevators* (2d ed., New York, 1911); Grain Dealers' Journal, *Plans of Grain Elevators* (3d ed., Chicago, 1913); *Annual Reports, Chicago Board of Trade; Annual Reports of the Department of Trade and Commerce* (Ottawa, Canada).

GRAINER PROCESS OF SALT MANUFACTURE. See Salt.

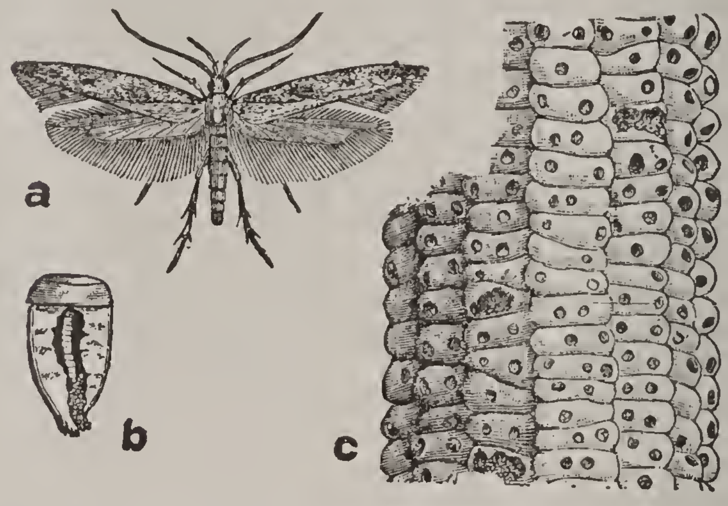
GRAINGER, grān′jẽr, James (?1721–66). An English physician and poet. He was educated at a school in North Berwick and studied medicine at Edinburgh. After three years of army life (1745–48) he settled in London, but had so little success in medicine that he turned to literature. Besides making a *Translation of the elegies of Tibullus and of the Poems of Sulpicia* (1759), sharply criticized in Smollett's *Critical Review,* and rendering some assistance in the preparation of Charlotte Lennox's translation of Brumoy's *Théâtre des Grecs* (1759), he wrote, during a stay in the West Indies, a long poem in heroic style on *Sugar Cane.* This was published in 1764, after it had provoked Dr. Johnson's ridicule because of a minute description of rats in the cane fields. Grainger's collected poems were printed in 1801. Besides a dissertation, *De Modo Excitandi Ptyalismum,* he wrote: *Historia Febris Anomalæ Batavæ Annorum 1746, etc., Accedent Monita Siphylica* (1753), and an *Essay on the More Common West India Diseases* (1764). He died at St. Christopher, of West India fever.

GRAIN′ING. A European cyprinoid fish (*Leuciscus lancastriensis*), of certain streams of the west of England and in some of the lakes of Switzerland. It is rather more slender than the dace, in its habits and food resembles the trout, rises readily at the artificial fly, and affords good sport to the angler. It may reach half a pound in weight and is excellent eating.

GRAINING (from *grain,* from Icel. *grein,* Swed., Norw. *gren,* branch; a doublet of *groin*). Fishing with the grain, a sort of pitchfork or spear. There are many varieties of grains, from the five-tine pattern, set crosswise, to the single-tine harpoon of the whaler. In some of its forms, notably that used in the capture of swordfish, the head of the grain remains in the fish after it is struck, attached to a line, but the handle is withdrawn. The most frequently used is one with two prongs, each half barbed inwardly.

GRAIN INSECTS. Several insects attack and damage stored grain of all sorts. The most conspicuous one is the caterpillar of a small, grayish-brown and black tineid moth (*Gelechia cerealella*), allied to the clothes moth and called corn moth in Great Britain, but known in the United States as fly weevil and Angoumois grain moth, from the old Province of Angoumois, France, where it has long been extremely destructive. It is most abundant in the Southern States, where on account of it grain cannot long be stored. It may at times attack other substances, such as books, pasteboard, woolen goods, or even wood. Salt mixed with the grain is said to be useful in checking the ravages of the larvæ, and the frequent turning over of the grain destroys both eggs and larvæ. When emptied, granaries should be thoroughly cleaned and whitewashed.

A different tineid, also called grain moth (*Tinea granella*), is another widespread and serious pest, especially to stored wheat; and a third moth (*Ephestia kühniella*), which since 1877 has been a source of vast damage in Europe, appeared in destructive numbers in North America about 1890. It multiplies with amazing rapidity, makes clots in flour or meal, or binds together grains of wheat, Indian corn, etc., by its silk-spinning and voracious caterpillars, and is extremely difficult to get rid of. Another destructive species of the same genus is also known. Consult *Insect Life,* vol. ii (Washington, 1890).



GRAIN MOTH AND ITS EFFECTS.

a, adult Angoumois moth (*Gelechia cerealella*); *b,* a kernel of maize inhabited by a caterpillar; *c,* part of an ear perforated by caterpillars.

Small beetles (weevils) of various kinds attack stored grain, especially those of the genus *Calandra.* They are minute, numerous, and lay eggs upon the kernels; the larvæ hatched from these bore into and consume the body of the grain, whence they emerge as perfect beetles in the autumn. The most approved remedy is to submit the grain to dry heat of not less than 130° F. or to the fumes of carbon disulphide. See, also, Corn Insects; and for insects attacking growing cereals, see the articles Wheat Insects; Rice Insects; etc.

GRAIN RUST. See Rust.

GRAINS OF PARADISE, or Meleguetta Pepper. An aromatic and extremely hot and pungent seed, imported from Guinea. It is the produce of *Amomum meleguetta,* or *Amomum granum paradisi,* a plant of the family Zingiberaceæ, with lanceolate leaves, one-flowered scapes (leafless stems), about 3 feet high, and ovate or elliptic-oblong capsules containing many seeds. By the natives of Africa these seeds are used as a spice or condiment to season their food; in Europe they are chiefly employed as a medicine in veterinary practice and fraudulently to increase the pungency of fermented and spirituous liquors. During the reign of George III brewers and dealers in beer in England were prohibited, under a heavy penalty, from even having the seeds in their possession. The name "meleguetta pepper," or "Guinea pepper" (q.v.), is also given to other pungent seeds from the west of Africa.

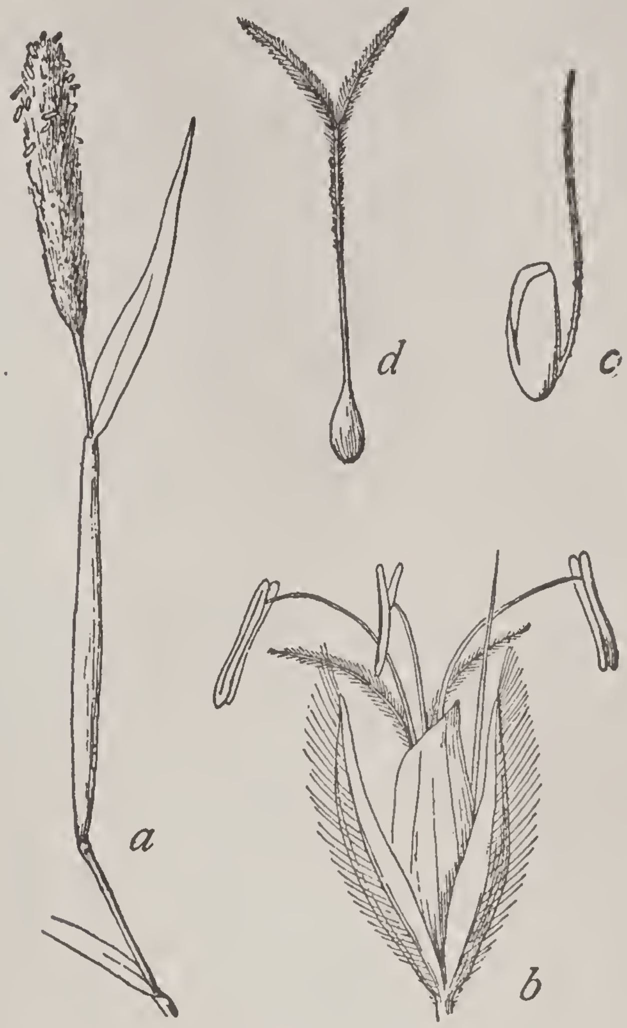
GRAM. East Indian name for chick-pea (q.v.).

GRAM (Fr., from Lat. gramma, Gk. γράμμα, weight of two obols, writing, from γράφειν, *graphein*, to write). A measure of weight in the metric system, originally defined as "the absolute weight of a volume of pure water equal to a cube of the one-hundredth part of a meter and at the temperature of melting ice," and the basis of the original kilogram of the Archives. Now, as the mass of the international kilogram is taken as unity, the gram becomes a unit of mass equal to one-thousandth part of it. See METRIC SYSTEM.

GRAM, GREGERS WINTHER WULFSBERG (1846–). A Norwegian jurist and statesman, born at Moss. He was educated at Christiania, studied in Paris, practiced law, and was early connected with the Department of Justice. From 1876 to 1882 he was Norwegian member of the International Tribunal in Egypt, and thereafter he was Governor of Nordlands Amt for a year; justice of the Supreme Court (1884–89); Minister of State at Stockholm in Stang's ministry (1889–91); and again on the Supreme Court bench. In 1892–93 he was member of the international court of arbitration in Paris for the settlement of the Bering Sea Controversy (q.v.); from 1893 to 1898 he was again Minister of State at Stockholm in the cabinets of Stang and Hagerup. He became Governor of the diocese of Hamar, and Governor of Hedemarkens Amt. Appointed in 1900 to serve for six years as member for Norway of the Court of Arbitration at The Hague, he was again called to this post in 1912 to serve until 1918. In 1903 he was referee in a case of arbitration between Germany, France, and England on one side and Japan on the other regarding taxes for legation houses at Tokyo; in 1904 he became a member of the Institut de Droit International; and in 1909 was appointed to the court of arbitration between Norway and Sweden for the settlement of reindeer questions.

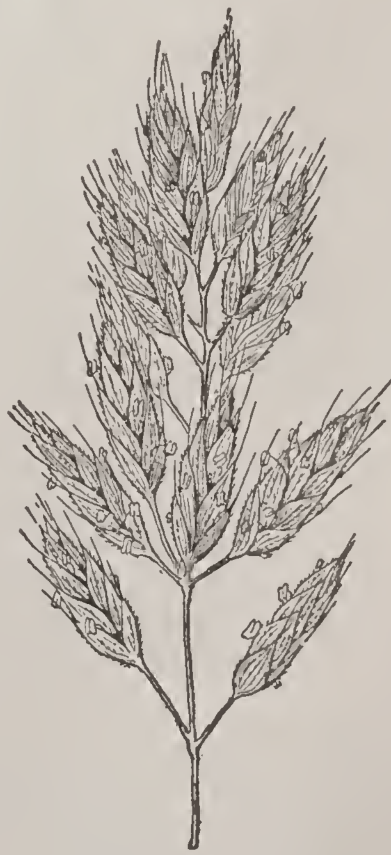
GRAMINEÆ, grȧ-mĭn′ē̇-ē (Lat. nom. pl., pertaining to grass, from *gramen*, grass). The great family of grasses, which is one of the largest and probably one of the most useful groups of plants, as well as one of the most peculiar. It is world-wide in its distribution and is remarkable in its display of individuals, often growing so densely over large areas as to form a compact turf. If the grasslike sedges be associated with the true grasses, there are about 6000 species, representing nearly one-third of all of the monocotyledons (q.v.). Here belong the various cereals, sugar canes, bamboos, and pasture grasses, all of them eminently useful plants. They are for the most part perennial herbs with profusely branching rootstocks which creep horizontally in the soil and give rise both to sterile shoots in the form of tufts of leaves and also to fertile shoots. The characteristic leaf of the group consists of a blade and a prominent sheath, at the junction of which appears the outgrowth called the ligule (q.v.).

The inflorescence of the grasses consists of spikes, racemes, or panicles, and is always composed of an aggregation of secondary inflorescences called spikelets. Each spikelet usually bears several flowers and also a number of bracts. The two lowest bracts (sometimes three) of each spikelet are sterile, i.e., they do not have flowers in their axils, and are known as glumes. Above these are a varying number of bracts subtending flowers, called flowering glumes (formerly outer or inferior paleæ). It is these flowering glumes which are often prolonged into the bristle-like tips known as awns. Opposite each flowering glume on the short flower stalk there is a bractlet known as the palet (formerly superior or inner palea), which is always awnless. Upon this same short flower stalk there often appear also two minute scales, known as lodicules, whose morphological character has caused considerable discussion. The flower consists usually of three stamens, each with an oblong or linear anther attached below the middle to the apex of the slender filament (versatile), and a single ovary bearing a style with two, rarely three, stigmatic branches. The various glumes are set so close together upon the axis of the spikelet that they overlap and are only partly visible, completely protecting the flowers. At the time of pollination the glumes separate and the dangling anthers and feathery stigmas become visible. After fertilization the pericarp (ripened ovary wall) adheres so closely to the seed that it seems to be an outer skin, forming the characteristic fruit (the grain) of the group. The embryo is peculiar in that it lies close to one side of the seed, so that it is com-



ALOPECURUS PRATENSIS.

a, the cylindrical spike; *b*, a single flower with its glumes; *c*, flowering glume with its awn; *d*, the pistil.



BROMUS MOLLIS.

pletely exposed by the splitting of the thin skin which covers it. In this case the single very large seed leaf, cotyledon, does not escape in germination, but remains as a broad, shieldlike absorbing organ, with its back against the starch-containing tissue (endosperm). This peculiar shield-shaped absorbing cotyledon is called the scutellum.

The grasses appear in the most varied situations and numbers. Their chief display, however, is in meadows and pastures, where they form the principal vegetation. The meadow grasses occur almost everywhere; the most important of the cereal grasses grow in temperate regions; certain cereals, as rice, etc., are cultivated in the tropics and subtropics; the arborescent grasses, such as the bamboo and its allies, form extensive groves in the tropics, and the small forms grow in the shade of the primitive forest. For forms of economic interest, see Grasses.

GRAM'MAR (OF., Fr. *grammaire*, from Lat. *grammatica*, from Gk. γραμματικός, *grammatikos*, pertaining to writing, from γράμμα, *gramma*, letter, from γράφειν, *graphein*, to write; ultimately connected with Ger. *graben*, Eng. *grave*). That branch of linguistic science which investigates the forms of speech in a language or group of languages and treats of the mutual relations of those forms. Grammar may be divided into normative or didactic, historical, and comparative. Normative grammar deals with the phenomena of a given language at a single period, establishing the linguistic usage for that epoch, any deviation from the standard there set being considered "bad grammar." As examples of normative grammar may be cited the ordinary treatises on the Latin of the Ciceronian period, the Attic Greek of the Periclean age, and most grammars of modern French, German, English, and the like. Historical grammar, as its name implies, discusses the historical development of a given language, usually from the earliest traces of the language in question down to the present time. Here no norm is set. The purpose of such a work is merely to present facts, not, as in the normative grammar, to lay down canons of usage. For instance, normative grammar of modern English states that two negatives are equivalent to an affirmative. Such a sentence as "he didn't hear nothing" as equivalent to "he heard nothing" is stigmatized as "bad grammar," i.e., as deviating from the norm. On the other hand, historical grammar observes that at present two negatives are equal to an affirmative. In early English, however, as in the Proverbs of Hendyng (thirteenth century), this is not true, for we have such constructions as:

Gef þou art riche & wel ytold,
Ne be þou noht þarefore to bold,
Ne wax þou noht to wilde.

(If thou art rich and well accounted,
Be thou not therefore too bold,
Nor wax thou not too wild.)

In like manner we find in Anglo-Saxon of the best period, as in Alfred's translation of Boëthius, such sentences as *on nãnum menn nyton nāne āre* (lit., they don't show no honor to no man; i.e., they show honor to no man). Historically there is no inherent correctness in the use of one negative or more than one. The best usage forms the only law. Historical grammar may, however, explain the origin of a usage without transcending its limits. Thus, in the example before us the double negative is based on a desire for emphasis (if one negative is good, two are better), the use of the single negative, on a sense of logic (one negative annuls another). Comparative grammar, which is usually historical rather than normative in type, groups different languages together for a comparative study of their forms and the relations of such forms. We thus have comparative grammars of Romance, Germanic, Indo-Germanic, Dravidian, or Semitic languages, and the like. Here the discussion will be only of normative and of historical grammar, the subject of comparative grammar being treated under the title Philology (q.v.).

History of Normative Grammar. Until the nineteenth century the history of grammar is confined to the normative type. Only with the introduction into Europe of the knowledge of Sanskrit did the impulse come to study language comparatively and historically. The few attempts made along those lines before had all proved abortive for lack of material and method, and grammarians contented themselves with recording linguistic phenoména of given periods. In the Orient grammatical study began in India with the Nirukta of Yaska (fifth century B.C.), although the first formal grammar of which we have any knowledge was that of Panini (q.v.), probably about 300 B.C. In some 3000 sections comprised in eight books he summarized and fixed the rules for classical Sanskrit. He enumerates 64 predecessors and was himself the forerunner of a long line of grammarians. His rules, which are couched in formulas almost algebraic in type and abounding in arbitrary designations (e.g., *aṭ* = the group of vowels, semivowels, and *h; am* = the same group together with the nasals; *lañ* = imperfect tense; *luñ* = aorist tense; *liṭ* = perfect tense; *luṭ* = periphrastic future, etc., where *l* denotes all personal endings, *t* a primary tense, *ñ* a secondary tense, etc.), formed the basis of many commentaries such as the *Vārttikas* of Katyayana (probably third century B.C.) and Patanjali's *Mahābhāṣya* (probably a half century later). About the middle of the seventh century A.D. the first complete commentary on Panini was composed, entitled *Kāśika Vṛtti*, or *Benares Commentary*, by Jayaditya and Vamana. Of the non-Paninean school of Sanskrit grammar the most important is Hemacandra of the twelfth century, the eighth book of whose *Siddhahemacandra* is the main source for native Prakrit grammar. The oldest grammarian in Prakrit (q.v.) is Vararuci, said by native tradition to have been a contemporary of Kalidasa (q.v.). Here, too, there is a long series of grammarians of minor importance. The Sanskrit term for grammar, *vyākāraṇa*, analysis, is indicative of the Indian method. Systematic and exact with their passion for minute division and subdivision, the work of the Hindus in this branch of learning reached its acme in the wonderfully exhaustive work of Panini, with which no grammar can be compared till modern times. The grammar of India was of indigenous origin. It discussed phonology, etymology, and inflection, but there is almost no mention of syntax. Of the other Oriental peoples only the Arabs and the Jews developed grammatical works. Arabic grammar was founded shortly after the Hejira. Abu 'l Aswad ad-Duil (died 688 A.D.) is considered the first Arabic grammarian, and he classified the parts of speech as nouns, verbs, and particles. This branch of literature in Arabic is an enormous one, no less than 2500 writers on grammar, lexicography, and philology being enumerated. The earlier grammarians are the most important, such as al-Farahidi, and his pupil, Abu 'l Hasan al-Basri, more usually known as as-Sibawaih (latter part of the eighth century). The source of Arabic grammar is involved in obscurity. It is, however, a significant fact that many of the Arabic grammarians, like more than one of their greatest historians, were Persians by birth. Through the medium of the Syrians Greek culture penetrated Persia, and doubtless some knowledge of Greek grammar came through the same channel, so that it does not seem unwarranted to suppose that Arabic grammar, which is treated with exactness and comprehensiveness, was ultimately influenced by Greek. It is at least certain that Syriac grammars, of which that of Elia of Sobha (eleventh century) is an excellent example, were based on Greek models. The Jewish grammarians had originally the same purpose as those of Arabia, the preservation of their sacred books. In a certain sense their grammar commences with the Massorites, although it was not until the Jews came under the influence of fully developed Arabic culture that they wrote formal grammars. The oldest extant Hebrew grammatical work is a lexicon by David ben Abraham (tenth century), but the greatest is that of Ibn Janaḥ (Rabbi Jonah), of the early eleventh century. His work, divided into 46 chapters, leaves scarcely a problem of Hebrew grammar untouched, and though after him there were many native Hebrew grammarians, none attained to his standard.

There was but one people of the ancient world except India which evolved an independent system of grammar. This was Greece. The contrast between the two beginnings is significant of the trend of thought of the two nations. In India the impulse was given by religion, in Greece by philosophy, especially by the Sophists (q.v.), such as Protagoras and Antisthenes. Many of the technical terms still used in grammar were coined by philosophers before formal grammar was known. On the other hand, there is a certain analogue between the two peoples, for the Indians applied grammar first to the *Rig-Veda* as the Greeks to the text of the Homeric poems. It was therefore the critics of Alexandria and Pergamum who were the first Greek grammarians. Of these the pioneer was Dionysius Thrax, who taught at Rome in the first century B.C., although the *Cratylus* of Plato, which is of great historic interest in grammar (see ETYMOLOGY), contains some general statements on grammatical topics. Following Plato Aristotle in the course of his philosophical works distinguished between nouns, verbs, and "connectives" (Gk. *ὀνόματα*, names, *ῥήματα*, sayings, *σύνδεσμοι*, bonds, including pronouns), and he also recognized the category of case (Gk. *πτῶσις*, fall). The Stoic philosophers made important contributions to grammatical knowledge. Thus Posidonius of Rhodes (first century B.C.) gave to the five cases of the Greek noun the names which they still have. The work of Dionysius Thrax, to which allusion has been made, was, however, the most important from a formal point of view. Summing up the work of his predecessors, he set forth a grammar so complete that it formed a model for all succeeding Greek and Latin works on the subject, was the standard, moreover, for grammars of other languages, as, e.g., of an Armenian grammar said by tradition to have been composed in the fifth century, and commented upon by Yohan Erznkachi in the fourteenth century, and still influences in form even the most modern and scientific grammars. While the Sanskrit grammarians, as we have seen, neglected syntax almost entirely, the Greeks paid special attention to this branch of grammar. This is the new contribution in the works of Apollonius Dyscolus (second century A.D), one of the greatest grammarians who has ever lived. The grammatical work of the Romans was but an imitation of their Greek models. The two names deserving special mention are those of Varro (116–c.28 B.C.), whose work on the Latin language is of great value and has some sections on etymology, the weakest side of Græco-Roman grammar, as it is one of the strongest of the Sanskrit, and Priscian (about the close of the fifth century A.D.), whose *Grammatical Commentaries*, in 18 books (the first two on phonology, two more on word formation, then 12 on inflection, and two on syntax), was the standard authority through the Middle Ages. Mediæval times show no progress in grammatical work. It is true that nonclassical languages received attention owing to the spread of Christianity, which offered the Scriptures in the vernaculars of the peoples to whom the new religion was carried. The only grammar in the technical sense of the word, however, of this period is the Welsh one, entitled *Desparth Edeyrn Aur*, written, as its name implies, by Edeyrn the Golden-Tongued, in the thirteenth century. With the revival of learning came a change. Latin still exercised its influence over all grammar, and the earliest Renaissance treatises are devoted to Latin in its relation to the vernaculars. One of the first works of this type was the anonymous *Tractatus dans modum teutonisandi casus et tempora* (Münster, 1451). A single sentence shows its quaint character: *Uñ eyn verbum neutrum edder neutrale heth darumme also, dat yd noch wercken edder lydent bedudet* (and a verbum neutrum or neutrale is thus called because it expresses neither action nor passivity). The first Greek grammar of this period was that written by the Byzantine exile Constantine Lascaris (Milan, 1476). To give a history of the many classical grammars which appeared from the beginning of the Renaissance to the new epoch inaugurated by the study of Sanskrit would lead too far afield. Suffice it to say that there was no real progress made in scientific grammar of any language until the exclusive devotion to Latin and Greek gave way at the opening of the nineteenth century to the broader study of other languages as well. The first grammars of the various nonclassical languages are as follows: Spanish by Ælius Antonius Nebrissensis (1492); Arabic by Peter of Alcalá (1505); Hebrew by Reuchlin (1506); Old Church Slavic, anonymously (1516); German by Ickelsamer (?) (1527); Hungarian by Erdösi (1539); Ethiopic by Victorinus (1548); French by Estienne (Stephanus) (1557); Syriac by Widmanstadt (1558); Polish by Stoienski (Statorius) (1568); Bohemian, anonymous (1567); Basque, anonymous (1587); Tagal by Santo Josepho (1610); Modern Greek by Portius (1638); Canarese by Estevano (1640);

Danish by Pontoppidan (1648); Annamese by Rhodes (1651); English by Wallis (1653); Lithuanian by Klein (1653); Chinese by Kircher (1667); Portuguese by Pereira (1672); Malay by Raimonds (1674); Swedish by Wallen (1682); Lettish by Adolphi (1683); Gothic, Anglo-Saxon, and Icelandic by Hickes (1689). The geographical discoveries of this period resulted linguistically in the publication of numerous grammars, including those of Aztec (1555); Chiapa (1560); Quichua (1560); Mixteca (1593); Tupí (1595); Aymará and Araucanian (1603); Huron (1631); Guaraní (1639); Massachusetts (1666); Chayma (1680). The eighteenth century was rich in grammatical contributions. We have grammars of Tamil by Ziegenbalg (1716); Hindustani by Schultze (1741); Fanti and Accra by Protten (1764); Bengali by Halhed (1778); Marathi, anonymous (1778). The American languages also received much attention. Thus, Moxan was treated by Marbau (1701); Tarsaca by Quixas (1714); Koran by Ortego (1732); Lulen by Machoni (1732); Totonacan by Bonilla (1752); Eskimo by Egede (1760); Otomi by Neve y Molina (1767); Abipone by Dobrizhofer (1784); Mohegan by Edwards (1788). The latter half of the century was marked by a steady growth of interest in comparative grammar, which was soon to revolutionize the study and the methods of the science. (The history of these branches of linguistics is treated more properly under PHILOLOGY.) Since the opening of the nineteenth century the history of grammar in its normative aspect has been modified to some extent by the comparative method, which is also responsible in great part for the historical mode of treatment. The trammels of Latin are less felt, although the simple normative grammar of any Indo-Germanic language is almost of necessity written along the old familiar scheme. The inadequacy of such a treatment is less apparent, however, in this group of dialects than in those of other language families. Many tongues which have no case, verb inflection, or the like corresponding to the Latin must be distorted before they can be forced into the conventional mold. Such incorporating languages as American Indian are cases in point. This difficulty is, it must be confessed, almost unavoidable. The mind of the linguist is, unhappily, so fixed by the forms of his own vernacular and its kindred languages that it is almost a psychic impossibility for him to escape their influence, especially when presenting the facts of a language in the form of a grammar.

Method of Normative Grammar. While normative grammars vary somewhat according to the special requirements of the languages of which they treat, or according to the class of readers to whom they are addressed, they should be written in general according to a uniform outline. The comprehensive definition of the language considered by the grammar in question is given, the dialectic subdivisions are described and localized, and their mutual relations to each other are presented. The orthography, pronunciation, and main principles of accent are next considered, and then the phonology is taken up systematically, preferably in the order of vowels, semivowels, nasals, liquids, mutes (gutturals, palatals, dentals, and labials), and spirants. After the phonology comes the noun formation, followed by the inflection of nouns and adjectives according to their various declensions, then pronouns and numerals, and finally adverbs, prepositions, conjunctions, and interjections. Next comes the section on verb formation, followed by the verb inflection arranged according to the different conjugations of the language under consideration. The division of syntax follows that of inflection. Here several arrangements are possible. The simplest method is to repeat the order observed in the inflectional part. The concluding portion of the syntax may often be devoted profitably to a discussion of the word order of the language, and a sketch of the metres found in the poetry should conclude the work. Comparisons of the dialects of the language with its literary form may often be introduced in their proper places. It must be borne in mind that this is the outline of a technical scientific grammar. Special grammars, as those for beginners and schools, will frequently deviate for practical purposes more or less from the outline here given. Any arrangement which seems best for the special object of such a grammar may be adopted. The various lessons into which school grammars are frequently divided are often provided with vocabularies of new words, and with sentences for translation from and into the language treated by the work. It is not unusual to append a chrestomathy of the languages containing extracts from some of its most important literary works and to follow this with a glossary.

Parts of Speech. In a discussion of grammar it is necessary to enumerate the relations of the various parts of speech to each other and to state what is comprised under each of these parts. The parts of speech are usually considered to be eight in number: nouns, adjectives, pronouns, verbs, adverbs, prepositions, conjunctions, and interjections. Under these several titles will be found more full accounts of their functions. The noun is conventionally described as the name of a concrete or abstract object; the adjective modifies the meaning of a noun or pronoun; the pronoun is a word standing in place of a noun; a verb expresses action or state of being; an adverb modifies a verb, adjective, or other adverb; a preposition shows the relation between one noun or pronoun and another; a conjunction connects clauses or words; the interjection is an expression of emotion standing in no grammatical relation with the rest of the sentence. While this division is sufficient for practical purposes, it is far from satisfying scientific accuracy. The noun and adjective are particularly closely allied, so that their functions often overlap, and there is in some instances no real distinction between the two. It seems probable that in the earliest period of the Indo-Germanic languages (q.v.) there was but one group for the two, the noun, and that from the collocation of nouns, one affecting the meaning of the other, the adjective was derived as a subdivision of the noun. Similarly the adverbs, prepositions, and conjunctions are shown by comparative philology to be in most instances stereotyped case forms of nouns. The pronouns, although in many cases, as in the demonstrative, interrogative, or relative classes, they are inflected like adjectives, form, in reality, a class distinct from the nouns. The cardinal numerals beyond four were originally nouns; below four they were in the adjective group. Verbs also form a separate class, although in the infinitive and participle they overlap the noun-adjective group. The old view that in their primitive inflection pronominal elements entered seems on the whole doubtful, although arguments may be alleged in its favor. The most primitive interjections are merely reflex emotive vocal actions and admit of no linguistic classification. They are perhaps the most primitive forms of speech, shared, like gesture language (q.v.), by man with the animals. The developed interjections are syncopated sentences. Scientifically, then, the parts of speech are four—nouns, pronouns, verbs, and interjections. Nouns and pronouns have normally gender, number, and case. Gender may be natural, indicating male, female, and sexless, or grammatical, as German *der Tisch* (masc.), table; *die Gabel* (fem.), fork; *das Weib* (neu.), woman. Here gender has nothing to do with sex. Number shows whether the word denotes one (singular), two (dual), or more than one or two (plural). Case expresses the relations of a noun or pronoun to the word with which it is most closely related in the sentence. The number of cases varies widely in different languages. The verb, like the noun, has number and, in some languages, gender. It also has person, mood, tense, and voice. Person denotes generally either the person speaking, the one addressed, or some other individual. Here again many non-Indo-Germanic languages have various deviations from this scheme. Moods are actual (indicative) or contingent, the most familiar examples of the latter being the subjunctive (will), optative (wish), and imperative (command). Tense expresses the time of action. Originally tense was merely present or past, the present serving as a future also, but there were later developed various subdivisions of tense, as the future and the perfect tense (present, past, and future perfect), and the like. Voice denotes whether the person is the agent (active), or is acted upon (passive), or acts in a way which affects himself (middle). The passive voice is much later in development than the active or than the middle, which has disappeared in the modern Indo-Germanic languages. All these grammatical categories are modified in various ways by different languages, and very many dialects have much more complex systems than the normal one for the Indo-Germanic group, which is here outlined.

Consult: Vater, *Litteratur der Grammatiken, Lexika und Wörtersammlungen aller Sprachen der Erde* (2d ed., Berlin, 1847); Benfey, *Geschichte der Sprachwissenschaft* (Munich, 1869); Müller, *Grundriss der Sprachwissenschaft* (Vienna, 1876–88); Steinthal, *Geschichte der Sprachwissenschaft bei den Griechen und Römern* (2d ed., Berlin, 1890); Paul, *Prinzipien der Sprachgeschichte* (4th ed., Halle, 1909); Gabelentz, *Sprachwissenschaft, ihre Aufgaben, Methoden und bisherigen Ergebnisse* (2d ed., Leipzig, 1901); Oertel, *Lectures on the Science of Language* (New York, 1901); Giles, *Manual of Comparative Philology* (London, 1901); Mauthner, *Die Sprache* (Frankfurt, 1906); *Beiträge zu einer Kritik der Sprache* (2d ed., 3 vols., Stuttgart, 1906–13); Ostwald, *Sprache und Verkehr* (Leipzig, 1911); Baumann, *Sprachpsychologie und Sprachunterricht, eine kritische Studie* (Halle, 1906); Bernard-Leroy, *Le langage, essai sur la psychologie normale et pathologique de cette fonction* (Paris, 1905); Nausester, *Denken, Sprechen und Lehren* (2 vols., Berlin, 1901–06); Pick, *Ueber das Sprachverständnis* (Leipzig, 1909); Tucker, *Introduction to the Natural History of Language* (London, 1908); Finck, *Die Sprachstamme des Erdkreises* (Leipzig, 1909); Moncalm, *Origin of Thought and Speech*, trans. from French by Whitmarsh (London, 1905).

GRAMMAR SCHOOLS. In the Middle Ages, when the existing schools were entirely under control of the monastic or the secular clergy, a distinction was drawn between the singing schools, or those in which instruction was limited to the elements of reading, writing, and singing, and the grammar schools, in which attention was directed to the study of language and literature, usually of a religious character. These grammar schools were, in fact, a survival or revival of the old Roman grammar schools, or schools of the grammatists. In England the term was in turn applied to the secondary schools that were established on independent foundations and were free from direct ecclesiastical control. Such schools were also called public schools. The earliest of these was Winchester, founded in 1378 by William of Wykeham, Bishop of Winchester. During the troubles incident to the Reformation in England many of these schools were swept away, but some of them were afterward restored. The most important of these schools, and hence often called the nine great public or grammar schools of England, are Winchester, Eton, Rugby, Charterhouse, St. Paul's, Harrow, Westminster, Merchant Taylors, and Shrewsbury. These schools were devoted wholly to the study of Greek and Latin grammar and rhetoric, and hence the title "grammar schools." The English colonists carried this type of school to America. Such an establishment was attempted in 1621 at Charles City, Va.; but, owing to the troubled character of the times, it had no permanency. In 1635 the Boston Public Latin School was established in Boston, and it has had a continuous existence to the present time. Many such schools were established in Massachusetts, and in 1647 a general school law was passed which contained the following provision: "It is further ordered, that where any town shall increase to the number of 100 families or householders, they shall set up a grammar school, the master thereof being able to instruct youth so far as they may be fitted for the university." Similar schools flourished in most of the Colonies until near the close of the eighteenth century, when a type of secondary school, called academies, took their place.

Towards the middle of the nineteenth century the term "grammar school" again came into common use in the United States to indicate a type of intermediate school devoted for the most part to the study of English grammar with some attention to geography, advanced arithmetic, and history. Previous to this time the only school inferior to the Latin grammar schools and the academies was the elementary school, devoted to the study of the elements of reading, writing, and arithmetic. The system of grading was gradually introduced about the middle of the century in the larger towns of Massachusetts. The elementary and the (English) grammar school were divided into from two to four, usually three, grades each, and were amalgamated into a system under one administration—that of the superintendent of schools. The term "grammar school" is now commonly used to designate the upper grades, ordinarily the fourth to the eighth, inclusive, of the common school, in which not only grammar, but also arithmetic, geography, history, elements of natural science, usually drawing, some form of manual training, and sometimes elementary algebra or geometry, with a foreign language, enter into the curriculum. See COMMON SCHOOLS; EDUCATION; GYMNASIA; MONASTICISM; NATIONAL EDUCATION, SYSTEMS OF; SCHOOLS; and the several grammar schools enumerated.

GRAMMA′TEUS. See SCHREIBER.

GRAMMICHELE, gräm′mė-kā′lȧ, or **GRANMICHELE.** A city in the Province of Catania, Sicily, 35 miles southwest of the town of Catania (Map: Italy, E 6). It has stone and clay quarries and markets grain, wine, cotton, fruit, and cattle. It was founded in 1693 by the Prince of Butera to take the place of the neighboring Occhialȧ, destroyed by an earthquake. A cave devoted to the worship of Ceres has been discovered east of the town. Pop. (commune), 1901, 15,075; 1911, 17,463.

GRAMMONT, grȧ′môɴ′ (Flem. *Geertsbergen, Geeraerdsbergen*). A small town of Belgium, in the Province of East Flanders, situated on both banks of the Dender, 22½ miles by rail south of Ghent (Map: Belgium, B 4). It has an episcopal college and manufactures of lace and textiles. The town is chiefly noteworthy on account of the Charter of Grammont granted here in 1068, which may be described as the Magna Charta of Flanders. Pop., 1900, 11,999; 1910, 12,619.

GRAMMONT, ORDER OF. See GRANDMONTAINS, ORDER OF.

GRAMMYSIA, grăm-mĭs′ĭ-ȧ (Neo-Lat., from Gk. *γραμμή*, *grammē*, line + *μῦς*, *mys*, mussel). A fossil pelecypod shell of clamlike form, with strong concentric folds, and one or more radial furrows extending from the umbones diagonally to the ventral margin of the shell. The genus appears in the Silurian rocks, but is especially abundant in the Middle and Upper Devonian marine formations, of which it is quite characteristic. The type species is *Grammysia hamiltonensis*, about 3 inches in length.

GRAMONT, grȧ′môɴ′. The name taken by the younger branch of the family of Aure, noblemen of Navarre.—PHILIBERT (?–1580) married (1567) Diane d'Andouins (1554–1620), mistress of Henry IV.—Their son, ANTOINE II (?–1644), was Viceroy of Navarre and was made Duke de Gramont. Of his four sons, two are well known.—ANTOINE III (1604–78), Marshal of France, took part in the wars in Holland, Italy, and Germany, fought in the battle of Freiburg, was taken prisoner at Nördlingen, but was exchanged immediately and was prominent at the battle of Lens (1648). During the wars of the Fronde he was on the side of the court. In 1657 he went to Spain to arrange for the marriage of Louis XIV with the Infanta María Theresa. He married Françoise de Chioré, a niece of Richelieu. His *Mémoires* were published in 1617. The more important members of the family are treated separately.

GRAMONT, ANTOINE ALFRED AGÉNOR DE, DUC DE GUICHE, PRINCE DE BIDACHE (1819–80). A French diplomat. He was born in Paris, was educated at the Ecole Polytechnique, and prepared himself for the diplomatic service. His opportunity for entering diplomatic life did not come until after the coup d'état of Dec. 2, 1851. In 1852 Napoleon sent him as Minister Plenipotentiary to Cassel. In the two years following he was transferred to Stuttgart and then to Turin, each transfer being in the line of promotion. In 1857 he was named Ambassador at Rome and in 1861 became the representative of the French Empire at Vienna. There he remained until January, 1870, when he was called to Paris to become Minister of Foreign Affairs in the Ollivier cabinet. In this position he played a prominent part in the events that led up to the Franco-German War and was probably responsible for the precipitancy with which France rushed into the conflict. On July 15 he gave to the Chambers a distorted version of the conduct of Prussia with regard to the Benedetti affair, thereby committing France to the declaration of war which followed on the 19th. On August 9, after the first reverses to the French arms, he resigned with the rest of the Ollivier cabinet, amid a storm of abuse from the French press. He spent the remainder of his life in retirement, writing apologies and explanations of his conduct, in which he tried to shift the blame for the catastrophe upon others. His principal work was *La France et la Prusse avant la guerre* (1872). Consult L. Thouvenel, *Le secret de l'empereur, correspondance . . . exchangée entre M. Thouvenel, le duc de Gramont, et le général comte de Flabant, 1860–1863* (Paris, 1889), and Emile Ollivier, *L'Empire libéral*, vol. xii (ib., 1910).

GRAMONT, PHILIBERT, COUNT DE (c.1621–1707). A celebrated French courtier. He was the son of Antoine, Duke de Gramont, who he claimed was a natural son of Henry IV. While still very young he served as a volunteer under Condé and Turenne, and distinguished himself by the most chivalric bravery. At the court of Louis XIV, with this reputation added to his youth, noble birth, a handsome person, fine talents and accomplishments, a lively wit, and good fortune at play, he had the audacity to aspire to be the rival of the King in the affections of one of his favorites. This caused him to be banished from France in 1662. He found a refuge at the court of Charles II of England. Here, after many adventures, he married Eliza Hamilton, sister of Anthony, Count Hamilton. He then went to France (1664) and served in the Low Countries. His wife became one of the ladies at the court of the Queen María Theresa. He had two daughters, one of whom was married to Henry Howard, Marquis of Stratford, and the other became Abbess of Poussay in Lorraine. The famous *Mémoires du Comte de Gramont* were written by his brother-in-law, Anthony, Count Hamilton (q.v.), trans. in "Bohn's Library" (London, 1846; new ed., New York, 1905).

GRAM′OPHONE. An apparatus for recording and reproducing sound, invented by Emile Berliner (q.v.) and publicly demonstrated in 1888 in Philadelphia. It is now marketed under such trade names as the Victor Talking Machine, Disk Graphophone, and Columbia Phonograph. It differed from the original phonograph and graphophone (qq.v.) in employing for its record, instead of a cylinder, a disk on which a horizontal zigzag record of even depth is cut, whereas in the other machines mentioned the record is of uneven depth or is made vertically in a line of one direction. Furthermore, with the gramophone no feed screw is required for propelling the stylus, as the record not only causes the reproducing point connected with the diaphragm to vibrate but also propels it. The difference, it must be understood, is not one of principle but of mechanism. Records for the gramophone were first made either by photo-engraving a sound tracing, or by direct etching in zinc or copper, and later by cutting the zigzag line into a wax surface. The original record is used to make a die or matrix by electrotyping, and from the latter impressions can be made in celluloid, rubber, or composition. The first successful duplicate record for the gramophone was made in celluloid by pressing the reverse of an original into that material while softened by heat, but this was given up in favor of hard rubber disks prepared by pressing accurately electrotyped reverses or matrixes from the original zinc record. This led to the commercial success of this disk machine by 1895, yet the rubber disks were not altogether satisfactory and for them was substituted a shellac composition which was harder than hard rubber and reproduced sounds louder and more crisp. Various other substitutes have been tried, and one of the most successful has been a fibrous die faced with a thin layer of shellac on both sides. These disks are lighter in weight, less affected by climatic conditions, and can withstand rough usage. At first the gramophone was driven by hand, but a noiseless clockwork motor was developed by Eldridge R. Johnson which in addition possessed great regularity of speed. With the expiration of the graphophone (q.v.) patents of Tainter and Bell, the etching process was abandoned for the wax-cutting process, but horizontal recording was retained, and, in short, all the good features of the graphophone were incorporated. With recording in wax the development of the range and brilliancy of the gramophone was inaugurated. Opera singers and orators, musicians and orchestras, were soon in demand for records for reproductions, and these records, as well as the utterances of the world's greatest men and women, are kept preserved in copper or steel matrices for the use of all posterity. See Talking Machines. Consult Berliner, in the *Journal of Franklin Institute* (Philadelphia), June, 1888, and August, 1913.

GRAM'PIANS. A short and low Australian mountain range extending north and south in southwestern Victoria (Map: Victoria, B 5). From its west slope flow the Glenelg and its affluents. The loftiest peak of the range, Mount William, is 4500 feet above sea level.

GRAMPIANS. The principal mountain system in Scotland, separating the Highlands from the Lowlands (Map: Scotland, E 3). They run from northeast to southwest, forming the well-known high grounds of Aberdeenshire, Kincardineshire, Forfarshire, and Perthshire. The average elevation of this main range is from 2000 to 3000 feet; the highest elevation is Ben Nevis (4406 feet), at its western extremity. An outlying branch of the Grampians extends northward from near the head of the valley to the Dee and comprises among its chief summits Ben Machdhui (4296 feet) and Cairngorm (4048 feet). Southward to the west extremity of the Grampians are situated numerous groups and chains of greater or less extent. Among these the chief summits are Ben Cruachan (3693 feet), Ben Lomond (3192 feet), Ben More (3845 feet), Ben Lawers (3984 feet), and Shichallion (3547 feet). The Grampians present towards the Lowlands a bold aspect, but in places they slope gradually into the fertile country below, offering excellent pasturage, and are everywhere intersected by beautiful valleys. On the north side the mountains are more rugged and are difficult to traverse. The mountains contain the finest deer forests in Scotland. Three railroads cross them in the wildest parts—one through the Pass of Lerry and Glenogle, and another by way of the Pass of Killiecrankie and Glengarry. The name "Grampians" applied to this mountain system by modern writers represents the Graupius (changed by an error to Grampius) Mons of Tacitus, a mountain (or range), the scene of the defeat of Galgacus by Agricola, the location of which has not been determined. Consult Kiepert, *Lehrbuch der alten Geographie* (Berlin, 1878), and P. MacNair, *Geology and Scenery of the Grampians* (Glasgow, 1908).

GRAM'PUS (older form *grampasse*, from Sp. *gran pez*, grampus, great fish, from *gran*, great, and *pez*, fish). A genus of large dolphins (Delphinidæ), having a spindle-shaped body, thicker in proportion than that of the porpoise, from which this animal differs also in the greater height of its dorsal fin, in the upper jaw projecting a little over the lower, and in the smaller number of teeth, which are wanting in the upper jaw of adults, and are from 6 to 14 in the lower jaw. The color is slaty gray more or less streaked with white. The genus is nearly related to that of the caaing whale (q.v.). Several species are known in the northern oceans and in the Mediterranean Sea. The common grampus, or cowfish (*Grampus griseus*), is sometimes 20 feet long and is a slow-moving, wholly inoffensive animal. It feeds on squid, swimming mollusks, and small fish. The name "grampus" is popularly applied to almost any cetacean which is too large to be called a porpoise and too small to be called a whale.

GRAN. A town of Hungary. See Esztergom.

GRAN, Gerhard (von der Lippe) (1856–). A Norwegian critic, born at Bergen and educated at Christiania. After teaching in secondary schools at Bergen for nearly 20 years, in 1900 he became professor of northern literatures in the University of Christiania. He was editor and founder (1890) of *Samtiden*, a monthly devoted to literature and politics; in 1904 became an editor for Norway of *Nordisk Tidskrift;* contributed important critical biographies to *Nordmænd i det 19. Aarhundrede* (24 parts, 1903–07); edited *Henrik Ibsen; Festskrift* (1898); wrote *Norges Dæmring* (1899); *Björnstjerne Björnson, Hövdingen* (1910), and a great work on Rousseau (1910–11; Eng. trans. by M. H. Janson, New York, 1912).

GRANACCI, grȧ-nä'chė, Francesco (1477–1543). A Florentine painter of the Renaissance. He was a pupil of Credi and then of Ghirlandaio and was influenced in turn by Botticelli, Michelangelo, Fra Bartolommeo, and Portonno. He assisted Ghirlandaio in his frescoes and after the latter's death completed much of his unfinished work. He is widely known because of his youthful friendship for Michelangelo, whom he induced to take up painting; but when he was afterward sent to Rome to assist the great master in his Sistine frescoes, the latter would not even receive him. He is best represented in the collections of Florence and the surrounding country; but his work may be also studied at Berlin and Munich.

GRANADA, grȧ-nä'dȧ, *Sp. pron.* grȧ-nä'ᴅȧ.

The capital of the Department of Granada, Nicaragua, on the northwest shore of Lake Nicaragua at the foot of the extinct volcano of Mombacho (Map: Central America, E 5). It is in a cacao-growing district and carries on trade in goldsmith's work, dyewoods, cacao, and hides. It is the northern terminus of the lake steamship line and is connected by rail with Managua and Corinto on the Pacific coast. Pop., 1908, 17,000. Granada was founded by Francisco Fernández de Córdoba in 1524 and was formerly the capital of the country. The city was taken by the filibustering expedition of William Walker in 1855.

GRANADA. A former kingdom of Andalusia, Spain, situated along the south coast, and bounded on the north by Cordova and Jaén, on the east by Murcia, on the south by the Mediterranean, and on the west by Seville. It comprises the modern provinces of Malaga, Granada, and Almería, with an aggregate area of 11,128 square miles. It is mountainous throughout, its eastern half being traversed by the snow-clad Sierra Nevada, reaching in the Cerro de Mulhacén a height of 11,420 feet. The principal river is the Jenil, a tributary of the Guadalquivir, whose valley, the "Vega of Granada," is a veritable garden. Mining and agriculture are the chief resources of the inhabitants—the former producing lead, zinc, iron, silver, and coal; the latter sugar, flax, fruit, grain, and, above all, wine and oil. There are some manufactures of textiles and bricks and some oil and flour mills. Communications are still in a backward state. A railroad connects Almería with Malaga and through Jaén and Cordova with Madrid. Pop. of the present province of Granada, 1910, 503,898. Capital, Granada (q.v.).

History. There has been considerable dispute concerning the etymology of Granada. There is no foundation for the statement that the city of Granada owes its name to its resemblance to a ripe pomegranate. As the Saracens, who expelled the Vandals from the southern part of Spain early in the eighth century, were by no means a homogeneous race, it was found necessary to allot various portions of the conquered territory to the different elements among the conquerors. In the rich Vega (valley) of the Elvira were settled the Syrians of Damascus, and these were the nucleus around which the Moorish Kingdom of Granada was afterward built up. Beginning in 1228, under the rule of Mohammed Al Ahmar, Granada increased in power, as it was a refuge for the Moors who had been driven from the central section of Spain. Al Ahmar was a great soldier and legislator, but still better is he remembered as the builder of the magnificent red pile on the slopes of the hills near the city of Granada. About 1273 Al Ahmar was succeeded by his son Mohammed II. The latter began war almost immediately against Castile. As long as he was aided by Yusuf, the ruler of Morocco, his armies were victorious, and after the battle of Ecija in 1275 advanced even to the gates of Seville. But in the following year Yusuf withdrew his aid and even gave a subsidy to the King of Castile. Moslem progress was checked, and when Mohammed II died, in 1302, the Moorish power depended only upon the dissension prevailing among the Christians. For several years Granada was a prey to disorder and anarchy. During the reign of Yusuf (1333–54) was fought the great battle of Salado (1340) in which Alfonso XI was completely successful. In 1362 Peter the Cruel of Castile (1350–69) lured King Abu Said to Seville and killed him with his own hand. From then on, the intrigues of the harem dictated the governmental policies, and as a result Granada was kept in a state of turmoil.

In 1482 Ferdinand and Isabella entered upon a war for the purpose of driving the Moors from Spain. They were aided by the civil wars which raged in Granada. (See BOABDIL.) On Nov. 25, 1491, the city of Granada, the last stronghold of the Moslems, capitulated, and in January, 1492, the sovereigns of Castile and Aragon made their entry into the far-famed Moorish capital. At the height of its power the Kingdom of Granada is said to have contained 3,000,000 inhabitants. See GRANADA (city).

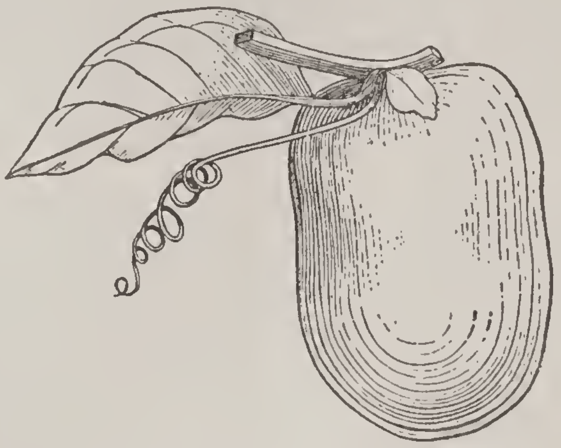
Consult: Burke, *History of Spain* (2 vols., London, 1895); Lane-Poole, *The Moors in Spain* (ib., 1907); Calvert, *Granada, Present and Bygone* (New York, 1908); Müller, *Die letzten Zeiten von Granada* (Munich, 1863); Irving, *A Chronicle of the Conquest of Granada* (Philadelphia, 1829).

GRANADA. A city of Spain, capital of the former Moorish kingdom, and of the modern Province of Granada, about 225 miles south of Madrid, on the river Jenil, near the centre of the province, and on the Madrid, Granada, and Algeciras Railway (Map: Spain, D 4). It is situated about 2200 feet above the sea, at the base and on the slope of the Sierra Nevada. It overlooks on the west the fertile Vega (plain) de Granada, while on the southeast are the peaks of Veleta (11,148 feet) and Mulhacén (11,421 feet), the latter being the highest mountain in Europe aside from the Alps and Caucasus. Granada consists of several parts, the little river Darro forming a natural division between the suburbs of the Albaicín and San Lorenzo and the greater part of the modern city on the north, and the Alhambra and the ancient suburbs of Churra and Antequeruela on the south. The Albaicín, once the residential quarter of the Moslem nobility, is now in ruins, inhabited principally by gypsies. Granada enjoys a delightful climate under a clear blue sky and rises picturesquely among the terraced hills covered with luxuriant vegetation and surmounted by the towers of the Alhambra. Though a "living ruin," it is still a city of remarkable beauty and distinction, retaining in a large measure its Moorish character. On the north are remains of the walls that surrounded the city of old, the last towers having been destroyed by the French in 1812, though some of the gates are still in existence. The streets, with the exception of those in the modern suburbs, are crooked and narrow, and the houses of Oriental architecture. Many old gardens with Moorish fountains have been preserved, and there are several fine plazas. The Plaza del Triunfo, extending from the Puerto de Elvira to the Plaza de Toros, is the largest in the city and has a central monument, gardens, and a magnificent promenade; the Plaza de Bibarrambla, or la Constitución, was the scene of many factional conflicts in the time of the Moors, and of various Moslem and Christian festivals, tournaments, etc.; the Plaza Nueva, laid out on a Roman bridge over the Darro, is the lower terminus of a street leading to the Alhambra. The beautifully shaded Alameda is continued along the Jenil by the attractive Pasco del Salón and Paseo de la Bomba, while on the opposite bank is the Paseo del Violón.

Preëminent among the architectural features of Granada is the Alhambra (q.v.). The Generalife, the summer palace of the Moorish princes, is next in interest among the ruined splendors of the Moslem power. Other examples of the Moorish style are still extant, and a number of the Christian churches of to-day are constructed on Moorish foundations, some of them incorporating parts of the mosques which they supplanted. Besides the cathedral (begun 1529, finished 1703), there are many notable churches, that of San Jerónimo having an historical interest, since it contains the tomb of Gonsalvo de Córdoba, "the Great Captain," whose remains, however, were desecrated by a mob and thrown to the winds. The cathedral, begun by Diego de Siloe, is richly decorated with marbles and has numerous statues and paintings by Spanish artists, and the tombs, among others, of Ferdinand and Isabella in the Royal Chapel, which was founded by them. Granada is an archiepiscopal see. It is the seat of a university, founded by Charles V in 1531, with four faculties and about 1000 students, occupying the old monastery of the Compañía de Jesús (Jesuits), and has a theological seminary and several other colleges, a normal school, and a school of fine arts. There are the provincial and university library with over 45,000 volumes and valuable manuscripts, a botanical garden, the museum of the Alhambra, and archæological and art museums. The charitable institutions include several hospitals and orphanages, an insane asylum, a maternity hospital, an asylum for the poor, etc. The imposing fortress (Torres Bermejas), built as a protection against the rebel Mozarabs, or Christian partisans of the Moors, has been converted into a prison. Industrially Granada is comparatively unimportant: it has, however, manufactures of textiles, paper, leather, liqueurs, hats, soap, flour, starch, macaroni, chocolate, etc. There is considerable commerce with the adjacent provinces, the trade being confined largely to the agricultural products of the Vega de Granada, celebrated in history as the scene of contest between the Moorish and Christian chivalry, but known also for its fertility. Pop. (municipality), 1900, 75,900; 1910, 77,425.

Granada arose near the site of the ancient *Illiberis*, the *Eliberi* of the Iberians. It is mentioned in the accounts of the early Arabian authors. Occupied by the Saracens in the eighth century, it became in the thirteenth century the capital of the extensive Kingdom of Granada and developed under the Moorish rule into a renowned centre of wealth, learning, and power, at its zenith having, it is said, between 400,000 and 500,000 inhabitants. The last stronghold of the Moorish power, it was invested by the armies of Ferdinand and Isabella, and after a 12 months' siege, famous for heroic exploits on both sides, it surrendered at the close of 1491, and in January, 1492, the Christian sovereigns made their entry into the city. There were numerous tumults and revolts occasioned by the events leading up to the final expulsion of the Moors in 1609; meanwhile Granada was slowly declining. The city was taken by the French in 1810 and in 1823, and in most of the revolutionary movements of the nineteenth century it played a part, being known as a liberal stronghold. Earthquakes caused some damage in 1884–85, and a fire in 1890 broke out in a portion of the Alhambra, but did no material damage.

GRAN′ADIL′LA (Sp., diminutive of *granada*, pomegranate). The edible fruit of certain species of passion flower (q.v.). The common granadilla (*Passiflora quadrangularis*) is extensively distributed over tropical regions and much cultivated. The plant is a luxuriant and very ornamental climber, often employed to form arbors and covered walks. It has large, beautiful, and fragrant flowers and oblong, fragrant fruit, often six inches in diameter, with a sweet and slightly acid pulp, very gratefully cooling. The apple-fruited granadilla, or sweet calabash (*Passiflora maliformis*), is plentiful in the woods of Jamaica. It is a very agreeable fruit, about two inches in diameter, with a gelatinous pulp and a rind so hard that it is sometimes made into snuffboxes and toys. The laurel-leaved granadilla (*Passiflora laurifolia*), sometimes called water lemon in the West Indies, has very long tendrils and bears red and violet flowers, and a fruit about the size of a hen's egg. The pulp, which is of a delicious, slightly acid flavor, is so watery that it is usually sucked through a hole in the rind. Several kinds of granadilla are occasionally cultivated in hothouses. In the south of Europe, Florida, and southern California they grow in the open air. *Passiflora alata*, a native of Brazil, by some botanists considered identical with *Passiflora maliformis*, produces an edible fruit about five inches long that is considered one of the best of the granadillas. Many of the other species have edible fruits. *Passiflora incarnata*, called maypops, is common in the southern United States, where its fruits are eaten. See Colored Plate of Passion Flowers.


GRANADILLA (*Passiflora quadrangularis*).

GRANARD′, George Forbes, third Earl of (1685–1765). An English sailor and diplomat, born in Ireland, son of Arthur Forbes, second Earl of Granard, and Mary Rawdon. He entered the navy when he was 17, and was under Rooke at the taking of Gibraltar. After serving at Malaga (1704), in the Channel, capturing French privateers (1705), and at the siege of Ostend (1706), he was transferred to the cavalry, but left it after a year (1708). On the recommendation of Queen Anne he was put in command of the *Grafton* (1709). After a splendid, half-piratical encounter with the Genoese, he joined the Allies and was slightly wounded at Vilaviciosa (1710). His capture of the Genoese fleet was disowned by the British government, but Forbes received £6000 for his share of the booty. After the Peace of Utrecht he commanded a fleet in the Mediterranean, and in 1719 was sent to Vienna to carry out the scheme of Charles VI to establish a great naval power in Naples or Sicily or on the Adriatic, but this came to nothing. He defended Gibraltar (1727); became governor of the Leeward Islands (1729); and in 1730 had a project to lead a colony to Lake Erie to act as a block against French invasion or encroachment from Canada, but it was not acceptable to Walpole. His last naval service was in 1731 in the Mediterranean. Two years later he was sent as Minister to Russia, and made a commercial treaty with that power. In 1742 he retired from the navy because of a quarrel with the Ministry. In 1741 he had entered the House of Commons and had led the opposition to Robert Walpole; but he soon afterward retired to private life. Consult Forbes, *Memoirs of the Earls of Granard* (London, 1858).

GRAN′BERY, John Cowper (1829–1907). An American clergyman of the Southern Methodist Episcopal church, born at Norfolk, Va. He graduated at Randolph Macon College in 1848, entered the Methodist ministry, and acted as chaplain in the Confederate army. After preaching in Washington, Richmond, and Petersburg he became professor of moral philosophy and practical theology in Vanderbilt University in 1875, and seven years later was elected Bishop in the Southern Methodist church. His publications include: *A Bible Dictionary* (1882); *Twelve Sermons* (1896); *Experience, the Crowning Evidence of the Christian Religion* (1901).

GRAN′BURY. A town and the county seat of Hood Co., Tex., 40 miles southwest of Fort Worth, on the Brazos River and on the Fort Worth and Rio Grande Railroad (Map: Texas, D 3). It has cotton gins, a flour mill, cottonoil mill, and ice plant, and is surrounded by a farming district. Pop., 1900, 1410; 1910, 1336.

GRAN′BY. A town of Shefford Co., Quebec, Canada, on a tributary of the Yamaska River, 54 miles southeast of Montreal, on the Central Vermont Railroad (Map: Quebec, F 5). It has a college, a Roman Catholic convent, and an academy. Its industrial establishments include an electric-light plant, saw mills, a foundry and machine shops, a grist mill, brickyard, and manufactories of rubber goods, rattan goods, chairs, furniture, cigars and cigar boxes, tobacco, blinds, sashes and doors, carriages, celluloid goods, plumbing supplies, elastic webbing, ice creepers, sap evaporators, and sap spouts. Pop., 1901, 3773; 1911, 4750.

GRANBY, John Manners, Marquis of (1721–70). An English general, the eldest son of the third Duke of Rutland. Educated at Eton and at Trinity College, Cambridge, he was in 1741 elected member of Parliament for Grantham, was reëlected in 1745 and 1747, and from 1754 until his death was a member from Cambridgeshire. In the rebellion of 1745 he raised a regiment of infantry, and accompanied the Duke of Cumberland into Scotland. He was made a major general in 1755 and a colonel of the Royal Horse Guards (Blues) in 1758, was dispatched to Germany the latter year, and was promoted to the rank of lieutenant general in February, 1759. For his meritorious conduct after the battle of Minden (Aug. 1, 1759) he was appointed to succeed George Sackville as commander in chief of the British troops, a post which he held during the remainder of the Seven Years' War, in which he distinguished himself in various engagements. In 1760, during his absence with the army, he was appointed a member of the Privy Council. After the peace of 1763 he was constituted master general of the ordnance, and in 1766 commander in chief of the army. He died at Scarborough, Oct. 18, 1770. Consult Manners, *Some Account of the Military, Political, and Social Life of . . . the Marquis of Granby* (London, 1899).

GRAN CANARIA, grän kȧ-nä′rē̇-ȧ. One of the Canary Islands (q.v.), among which it ranks third in size and second in population, situated 74 miles from the northwest coast of Africa (Map: Spain, G 5). It is almost circular in shape, with an area of 644 square miles. It is of ancient volcanic origin, with a number of extinct craters, none of which have been active within historical times. It is rugged, mountainous, and picturesque. The coasts fall in most places abruptly to the sea, and in general the land rises in terraces to the interior. At Los Pechos it reaches to a height of 6430 feet. The climate of the island is delightful, and one of the most healthful in the world, ranging from 60° in winter to 80° in summer. The vine is one of the principal plants cultivated, and some coffee is grown, but the chief occupations of the inhabitants, who in 1910 numbered 162,601, chiefly concentrated around the capital, Las Palmas (q.v.), are fishing, commerce, and the care of tourists, who annually number from 60,000 to 70,000. It was not until 1483, 78 years after the first landing of Béthencourt, that the brave islanders were finally subdued by the Spaniards.

GRAN CAPITÁN, kä′pē̇-tän′, El (Sp., The Great Captain). A surname of the famous Spanish soldier Gonsalvo de Córdoba.

GRAN CHACO. See Chaco, El Gran.

GRAND, Sarah. The assumed name of Frances Elizabeth Clarke, an English novelist. She was born in Ireland of English parents, and married, at the age of 16, Lieutenant Colonel McFall of the English army, whom she accompanied in his travels in the East, visiting India, China, and Japan. At the age of 26 she wrote *Ideala*, which was followed by *The Heavenly Twins* (1893). The latter book, to which she owes her reputation, was completed at a much earlier date, but could not find a publisher for several years. She is also the author of a collection of stories entitled *Our Manifold Nature* (1894); *The Beth Book* (1897); *The Modern Man and Maid* (1898); *Babs the Impossible* (1900); and *Adam's Orchard* (1913).

GRAND ALLIANCE. A league formed in 1689 and again in 1701 in opposition to Louis XIV of France. That of 1689 was entered into by the German Emperor, the Netherlands, and England to restore the conditions of the treaties of Westphalia and the Pyrenees, and was joined by Savoy in 1690. That of 1701 was entered into by England, the Netherlands, and the German Emperor to prevent the union of the crowns of France and Spain under the Bourbon dynasty; it was subsequently joined by Prussia, Portugal, and Savoy.

GRAND ARMY OF THE REPUBLIC. An American patriotic society organized in Decatur, Ill., on April 6, 1866. Its existence is primarily due to Dr. B. F. Stephenson and Chaplain W. J. Rutledge, of the Fourteenth Illinois Infantry, who, in February, 1864, conceived the idea of its formation. The principal objects of the order are to maintain and strengthen the fraternal feelings which bind together the soldiers, sailors, and marines who united to suppress the Rebellion; to perpetuate the memory and history of those who have died; and to lend assistance to the needy and to their widows and orphans. The society admits to membership any soldier or sailor of the United States army, navy, or marine corps, who served between April 12, 1861, and April 9, 1865, and was honorably discharged, and also members of State regiments who were called into actual service and were subject to the orders of the United States and general officers. The official badge consists of a miniature strap and ribbon showing the national flag, from which is hung the bronze star of the membership badge. This star shows a medallion, on which in relief are a soldier and sailor clasping hands in front of a figure representing "Liberty," while in the foreground are two freedmen; the entire design being supported on the sides by the national banner. The Grand Army is organized into departments, representing the States and Territories, and numbered in 1906 5942 local camps. The membership in 1890 reached a total of 409,487, but this number has steadily decreased since, and in 1913 was 180,224. The annual death rate was in 1914 about 12,000. Annual meetings, called encampments, are regularly held in the leading cities of the Union. The members wear on official occasions a dark-blue uniform and black slouch hat. To this organization is due the establishment of Memorial Day. Because of its large membership, its close organization, and its nearly unanimous adherence to Republican policies, the Grand Army has necessarily exerted a powerful, if often indirect, influence upon national politics and the choice of national candidates. Every Republican President from Grant to McKinley served in the Civil War, and polled practically the entire Grand Army vote. In 1869 the Grand Army laid down the rule that the organization should in no way be used for partisan purposes, partisan discussion, or political nominations. But while the letter of this law was kept, the Grand Army has no doubt influenced the cause of pension legislation. The Disability Act of 1890, doubling the pension roll, was due to it; so were earlier and later laws in some part, and so was the insistence upon a liberal interpretation of the laws. The Army has been also, and beneficently, active in the care and education of the orphans of deceased comrades and in the establishment of soldiers' homes. Consult R. B. Beath, *History of the Grand Army of the Republic* (New York, 1889), and O. M. Wilson, *The Grand Army of the Republic under its First Constitution and Ritual* (Kansas City, Mo., 1905).

GRAND ASSIZE. A valuable early form of the jury, instituted by Henry II for the purpose of trying the title to land. It was available only to the tenant or defendant in a proceeding originated by a writ of right, who was offered the choice of defending his title by wager of battle or by the grand assize. The jury was composed of "lawful knights, girt with swords" (instead of, as was the case with the petit jury, "good and lawful men" of the vicinage), appointed by a body of four knights, chosen by the sheriff. It consisted of 12 or 16 men, it is uncertain which, though it would seem that the four electors were entitled to add themselves to the 12 chosen by them. The institution of the grand assize was one of the great reforms in legal procedure, as it marked the decay of the barbarous method of trial by battle and the establishment of the system of trial by jury. It survived until abolished along with real actions by Act of Parliament in 1834 (3 and 4 Wm. IV, c. 42). See Assize; Jury. Consult Thayer, *Preliminary Treatise on Evidence at the Common Law* (Boston, 1898), and Pollock and Maitland, *History of English Law* (2d ed., ib., 1899).

GRAND BANK (the Newfoundland Banks). An elevated submarine plateau of triangular shape in the Atlantic Ocean, an extension of the continental shelf stretching for 200 miles along the coast of Newfoundland, and extending towards the southeast for over 500 miles towards the coast of Europe. It has an average depth of 40 fathoms, ranging from a minimum of 10 fathoms to a maximum of 160 fathoms. It is supposed to be composed of deposits of solid matter brought from the Arctic seas by icebergs, which gradually melt by contact with the warm current of the Gulf Stream in these latitudes. The British and French submarine cables lie along this elevation. Near the American coast the Grand Bank teems with marine life, and is noted as the favorite resort for codfish. Some 100,000 fishermen of British, American, and French nationalities, in specially equipped vessels, styled "bankers," ply their vocation amid the many dangers of storm, fog, and icebergs incidental to the region.

GRAND BANK. A town and port of entry in the Burin district, Newfoundland, on the south side of Fortune Bay (Map: Newfoundland, E 5). The chief industries are connected with the fisheries, and an important trade is carried on with the French island of St. Pierre. Pop., 1901, 1427; 1911, 1605.

GRAND CANAL, The (It. *Canale Grande*). The chief waterway of Venice, a canal 30 to 60 yards wide, which winds through the city in the shape of the letter S. On it are situated many of the famous palaces of Venice, still distinguished by the posts painted with the owner's heraldic colors. It is crossed by the famous Rialto bridge.

GRAND CANARY. See Gran Canaria.

GRAND CAÑON OF THE COLORADO. See Colorado River.

GRAND CAPE, kā′pė (Lat. *cape*, take, from initial words of the writ). In English law, the name of an ancient writ whereby, in an action of dower, on the failure of the defendant to appear in answer to the summons, a third part of his lands is attached to await the decision of the court. If the defendant do not appear on the return of the writ of grand cape, judgment is given in favor of the widow, who is thereupon entitled to take possession of the lands in satisfaction of her dower.

GRAND'-COMBE, gräɴ′-kôɴb′, La. A town in the Department of Gard, France, 31 miles northwest of Nîmes (Map: France, S., J 4). It has glass works, and in its vicinity are productive mines of coal, zinc, lead, copper, and iron. Pop., 1901, 11,484; 1911, 11,547.

GRAND COUTUMIER (gräɴ ko͞o′tụ′myā′) **OF NORMANDY.** A collection of the ancient customary law of Normandy, supposed to have been compiled about the middle of the thirteenth century. It is one of the most important of a large number of similar collections made in France and Germany at that period. There is no ground for the belief that the *Grand coutu-*

mier was carried over from Normandy to England or that it was ever regarded as English law. It was originally written in Latin, but was early translated into French. The best recent editions are those of De Gruchy (Jersey, 1881) and Tardif (Rouen, 1896).

GRAND CYRUS, gräɴ sė̄'rụs', Le (Fr., The Great Cyrus). The subtitle of Scudéry's *Artamène*, and an obvious parody on the name of Le Grand Condé. The hero of the story is a caricature of that historic personage.

GRANDE CHARTREUSE, gräɴd shär'trēz'. See Chartreuse, La Grande.

GRANDE ÉCAILLE, gräɴ dȧ'kī'y' (Fr., great scale). The tarpon (q.v.), so called by French-speaking fishermen along the coast of the Gulf of Mexico (often locally corrupted into "grandkyke").

GRANDEES, grăn-dēz' (Sp. *grandes*, great men). The name by which the most highly privileged class of the nobility of Castile were known after the thirteenth century. The honors of the grandees were hereditary; they held lands from the crown, were exempted from taxation, could not be imprisoned for debt or subjected to torture, and could not be summoned before a civil or criminal tribunal without a special warrant from the King. They were entitled to decide private feuds by an appeal to arms, and had a right to leave the kingdom, and even to enter the service of a foreign prince at war with Castile, without incurring the penalities of treason. Gradually the grandees monopolized the high offices of state, and even invaded the King's Council. Besides these privileges, which were common to them with the rest of the higher nobility, the grandees possessed several which were peculiar to themselves, or which they shared only with the so-called *titulados*—the counts and dukes. Of these, the chief was the right, in all public transactions, of remaining covered in the presence of the King. The King addressed a grandee as *mi primo*, "my cousin-german"; whereas any other member of the higher nobility he called only *mi pariente*, "my relative." In the national assemblies the grandees sat immediately after the prelates and before the *titulados*. They had free entrance into the palace and into the private chambers of the monarch, and on the occasion of religious solemnities they had their place in the royal chapel next to the altar. Their wives shared their dignities, the Queen rising from her seat to greet them. Under Ferdinand and Isabella, Cardinal Ximenes succeeded in checking the power of the feudal nobility by ignoring their time-honored privileges and rewarding men of low birth with important offices. Charles V and Philip II continued the policy of Ferdinand and Isabella, and succeeded in making the grandees a dependent court nobility. Gradually three classes of grandees arose out of this merely nominal nobility. It was the privilege of the first class to be commanded by the monarch to be covered before they had begun to address him. At the coronation of Charles V at Aix-la-Chapelle, the princes of the empire refused to assist at the ceremony if the grandees were allowed to be covered, and for once the grandees renounced the privilege. After the accession of Joseph Bonaparte in 1808, the dignities and privileges of the grandees were entirely abolished, but they were partially reëstablished after the restoration in 1814.

GRANDE MADEMOISELLE, gräɴd må'd'mwä'zĕl', La. A title given to Anne Marie Louise d'Orléans, Duchesse de Montpensier, for her beauty, wealth, and valor. See Montpensier.

GRANDES CHRONIQUES DE FRANCE, gräɴd krō̇'nė̆k' d*e* fräɴs (Fr. Great Chronicles of France). An historical prose compilation begun by a monk of Saint-Denis in 1274, and continued by the members of that community until the reign of Charles V, after which it was continued by lay authors to the time of Louis XI.

GRAND FALLS. A magnificent cataract of the Grand River (q.v.), Labrador, in lat. 53° 50′ N., long. 63° 50′ W., 250 miles from the sea. In a distance of 12 miles the river drops over 760 feet, culminating in a vertical drop of 316 feet over a rocky platform 200 feet wide. The roar of the falls can be heard at a distance of 20 miles. The cañon through which the river falls is 25 miles long, with an average depth of 400 to 500 feet. The first European to see the cataract was Mr. McLean, a Hudson's Bay Company official, in 1839. Accounts of its existence had become mythical until it was rediscovered by two separate expeditions in 1891, and officially surveyed by the Canadian Geological Survey in 1894.

GRAND FALLS. A town and port of entry of Victoria Co., New Brunswick, Canada, 95 miles southwest of Chaleurs Bay, on the Canadian Pacific Railroad (Map: New Brunswick, B 1). It is at the head of navigation on the river St. John, with which it has steamboat communication. Its industrial establishments include lumber mills, woodworking factories, a power company, and saw, grist, and planing mills. It is a favorite tourist and sporting resort on account of its fine scenery, cool climate, partridge and duck shooting. The falls, estimated at from 50 to 100 feet high, are very picturesque; a good view of them is obtained from a suspension bridge over the river. Pop., 1911, 1280.

GRANDFATHER'S CHAIR. Two series of tales for children by Nathaniel Hawthorne, published respectively in 1841 and 1842. The stories are about famous persons and events in early American history.

GRAND FORKS. The chief town in southeast Yale District, British Columbia, Canada, on the forks of the Kettle River and on the Canadian Pacific, the Great Northern, and the Kettle Valley railways, 95 miles southwest of Nelson by rail, and about 25 miles west (direct) of Rossland (Map: British Columbia, E 5). It is a customs port and railway divisional point, with roundhouse and machine shops, and possesses federal and provincial government buildings, courthouse, and an opera house. Its industrial establishments include important smelting works, iron works, nurseries, a foundry, cement-block works, breweries, and a saw mill. It is situated in a fine fruit-farming district, and has electric lighting and water works. Pop., 1911, 1577.

GRAND FORKS. A city and the county seat of Grand Forks Co., N. D., at the confluence of Red Lake River with the Red River of the North, about 180 miles (direct) northeast of Bismarck, the State capital, on the Great Northern and the Northern Pacific railroads (Map: North Dakota, H 3). The University of North Dakota, opened in 1884, is situated at University, two miles away. Grand Forks is the seat of St. Bernard's Academy (Roman Catholic) and contains a Carnegie library, several hospitals, and an extensive system of city parks. It is the distributing centre of a large agricultural and lumbering district, has extensive jobbing interests, and carries on an important trade in wheat, flour, lumber, live stock, etc. Its industrial establishments include flour and lumber mills, grain elevators, brickyards, a foundry, boiler works, and manufactories of awnings, art goods, culverts and road machinery, furniture, gasoline engines, harness, rugs and carpets, candies, etc. Grand Forks was settled in 1871, and was incorporated 10 years later. The water works are owned by the city. Pop., 1900, 7652; 1910, 12,478; 1914 (U. S. est.), 14,827.

GRAND HA′VEN. A city, port of entry, and the county seat of Ottawa Co., Mich., on Lake Michigan, at the mouth of the Grand River, 35 miles by rail west-northwest of Grand Rapids, on the Grand Trunk, the Grand Trunk, Grand Haven, and Muskegon, and the Pere Marquette railroads (Map: Michigan, C 5). It has a Carnegie library, Akeley College for girls, United States customhouse, and a county courthouse. Highland Park and Spring Lake, both popular summer resorts, are in the vicinity. There is a fine harbor, with steamboat lines to the principal lake ports, and an important trade is carried on. Grand Haven is the centre of extensive fishing, and fruit and celery growing interests, and has manufactures of engines, refrigerators, furniture, printing presses, leather, machinery, pianos, brass novelties, barrels, baskets, shoes, etc. First settled in 1835, Grand Haven is governed by a mayor, elected annually, and a city council. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 4743; 1910, 5856.

GRANDIDIER, gräɴ′dē′dyȧ′, Alfred (1836–). A French explorer, born in Paris. He studied natural history and geography. When about 20 he made his voyage to South America with his brother, Ernest Louis Marie, the collector, and M. Janssen. After traveling extensively in the Americas he went to India (1863), Ceylon, and traveled along the east coast of Africa. In 1865 he first visited Madagascar. In several succeeding visits he collected the material for his *Histoire physique, naturelle et politique de Madagascar*, a work comprising 40 volumes, the first of which appeared in 1876, and which is the authority on the island. His other works include some valuable maps, and *Madagascar et ses habitants* (1886); *Histoire de la géographie de Madagascar* (1893); *Les voyageurs français à Madagascar pendant les trente dernières années* (1894).

GRAND INQUEST. See Grand Jury.

GRAND ISLAND. A city and the county seat of Hall Co., Neb., 154 miles by rail west by south of Omaha, on the Union Pacific, the Burlington Route, and the St. Joseph and Grand Island railroads (Map: Nebraska, F 4). It is the seat of Grand Island College (Baptist), opened in 1892, and has a Carnegie library, St. Francis Hospital, and the Nebraska Soldiers' and Sailors' Home. There are several wholesale and retail establishments, a large beet-sugar factory, canning, windmill, cement-block, candy, and wire-fence factories, brickworks, a flouring mill, two broom factories, a creamery, and railroad shops of the Union Pacific. The city carries on an extensive live-stock trade. Settled in 1857, Grand Island was incorporated in 1872. Under a charter of 1901, the government is administered by a mayor, elected every two years, and a city council. The water works and lighting plant are owned and operated by the municipality. Pop., 1900, 7554; 1910, 10,326; 1914 (U. S. est.), 11,505.

GRANDISSIMES, gräɴ′dē′sēm′, The. A novel by George W. Cable (1880), the story of an old New Orleans family.

GRAND JUNCTION. A city and the county seat of Mesa Co., Colo., 250 miles (direct) southwest of Denver, at the junction of the Grand and Gunnison rivers, and on the Denver and Rio Grande, the Colorado Midland, and the Grand Junction and Grand River Valley railroads (Map: Colorado, A 2). It is one of the most important towns in west Colorado, and is the centre of a fertile agricultural region, served by a large irrigation canal, and is especially noted for its fruits. There are extensive coal interests, and machine shops, lumber yards, large railroad shops, brickyards, flour and planing mills, and a beet-sugar factory. Noteworthy features are the Carnegie library, Unaweep Cañon, and the National Monument Cañon. Grand Junction adopted the commission form of government in 1910. The water works are owned by the city. Pop., 1900, 3503; 1910, 7754.

GRAND JURY. The assembly of good and sufficient men, summoned by order of the sheriff to attend every session of the peace, and every commission of oyer and terminer and general gaol delivery in England, for the purpose of inquiring into alleged criminal offenses, and of returning to the court their delivery thereon. The institution of the grand jury dates back to the earliest period of English history, having been in use among the Saxons. It would seem from a law of Ethelred that the number of the grand jury was originally 12; but we learn from Bracton that, in the time of Henry III, it was the practice to return four knights for every hundred, who elected 12 other knights, or else 12 *liberos et legales homines*, to take part with them in the inquest. Towards the latter part of the reign of Edward III, in addition to the inquest for the hundred, the sheriff was required to return a panel of knights for the whole county. This jury was called *le graunde inquest*, and made inquiry for the county, while the jury for the hundred inquired for its own district only. After the establishment of the *graunde inquest*, the practice of summoning a jury of the hundred gradually went out of use; but until 6 Geo. IV, c. 50, it was deemed necessary that some of the grand jury should be summoned for every hundred. At the present day, the grand jury must consist of no fewer than 12 nor more than 23 members. A grand jury is summoned for every assize, and for the quarter sessions in counties and boroughs. After having the oath administered, and receiving a charge from the judge, the grand jurors retire to their room, and the various indictments, which are called bills, are laid before them. The duty of the grand jury is simply to inquire whether there is sufficient prima facie evidence to require a trial. For this purpose they may require the same evidence, written and parol, as may be necessary to support the indictment at the trial. But in practice, having ascertained that the crown has a sufficient prima facie case, they return a true bill, the evidence in behalf of the accused being reserved for the trial. Witnesses are sworn on their examination before the grand jury by an officer appointed by the court. When the jury have come to a conclusion, the clerk indorses on the indictment *A true bill* in case the jury, or a majority of 12, are satisfied that the case is sufficiently strong. In case they are not satisfied, the indictment is indorsed *Not a true bill.* The foreman, accompanied by one or more of the jurors, then carries the indictments into court, and presents them to the clerk, who states to the court the nature of the charge and the indorsement of the jury.

In the United States the grand jury is also summoned by the sheriff, and, as in England, its function is, upon such evidence as the attorney of the State may present, to determine whether persons accused of crime shall be indicted and tried therefor and to inquire into such other matters as may be confided to them by the court or may come to their knowledge. They may accordingly make presentment of any matter requiring remedial action by the courts or the legislature, as the general prevalence of crime, the inefficiency of the law or of its administrative agents, the neglect of their duty by public officials, and the like. In inquiring into the commission of a particular criminal charge they do not examine witnesses for the defense; for it is not their duty to find a verdict, but only to decide if there is prima facie evidence of guilt such as to warrant a trial. In all essential particulars this institution is the same in the United States as in England, but upon minor points there are in practice some differences. The number of men required to constitute a grand jury is not the same in every State, but varies from 12 to 23. The court may, in its discretion, select the foreman or allow the jurymen to do so.

The importance of the grand jury in our legal system is not due to any general impression of its value in the ordinary administration of the criminal law, but to the great rôle which it has played as a bulwark against royal aggression. The crown in England has always enjoyed the right of instituting criminal prosecutions by information (q.v.), and the abuse of this prerogative was one of the principal grounds of the popular uprising against the Stuarts in England and against George III in America. It is to this feeling, that only the people should have the power of instituting criminal prosecutions, that we owe the provision in the American Constitution guaranteeing the institution of the grand jury. Most of the State constitutions have similar provisions. Consult Edwards, *The Grand Jury, Considered from a Historical, Political, and Legal Standpoint* (Philadelphia, 1906). See Jury.

GRAND LAKE, or **LAKE CHETIMACHES**, shĕt'ē-mȧsh'. A shallow lake of southern Louisiana, surrounded by the parishes of St. Martin, Iberville, Iberia, Assumption, and St. Mary (Map: Louisiana, C 4). It is about 30 miles long and has a maximum width of about 9 miles. The waters of the Atchafalaya River and Lake Feusse Point flow into it at the north, and the Grand River at the south. The Myrtle Bayou drains the lake into Atchafalaya Bay, Gulf of Mexico.

GRAND LAR'CENY. See Larceny.

GRAND LEDGE. A city in Eaton Co., Mich., on the Grand River, 12 miles west of Lansing, on the Pere Marquette Railroad (Map: Michigan, E 6). It is a popular summer resort and has manufactures of sewer pipe, flour, chairs, conduits and tile, foundry products, etc. Coal and fire clay are found in the vicinity. Pop., 1900, 2161; 1910, 2893.

GRAND MAL, gräɴ mȧl. See Epilepsy.

GRAND MANAN'. An island of Charlotte Co., New Brunswick, Canada, off the Maine coast, at the entrance to the Bay of Fundy (Map: New Brunswick, C 4). It has an area of 36,352 acres, with abundance of timber and excellent facilities for shipbuilding. Fishing is the leading occupation of the inhabitants; porpoise fishing in particular is the specialty of a small settlement of Quoddy Indians at Indian Beach, on the north. The island is traversed with good roads and is a favorite summer resort, on account of its varied and picturesque scenery, angling, and shooting, and cool and bracing climate. The United States is represented by a consular agent. Pop., 1901, 2671; 1911, 2444.

GRAND MASTER. The title borne by the heads of the great military orders of the mediæval ages, such as the Hospitallers, the Templars, and the Teutonic Knights, and now applied to the highest officials of numerous orders and fraternal organizations.

GRAND MÈRE, gräɴ' mâr'. A town in Champlain Co., Quebec, Canada, situated on the north side of the St. Maurice River and on the Canadian Northern and Canadian Pacific railways, 21 miles north of Three Rivers (Map: Quebec, F 4). It has a Roman Catholic convent. Its industrial establishments include pulp and paper mills, an electric-power plant, and manufactories of sashes, doors, shirts, stoves, and boots. Pop., 1901, 2511; 1911, 4783.

GRAND MONAD'NOCK. See Monadnock, Grand.

GRAND MONARQUE, gräɴ mȯ'närk', Le. One of the many titles of Louis XIV of France.

GRANDMONTAINS, gräɴ'môɴ'tăɴ', **GRANDMONTINES**, gräɴ'môɴ'tĭnz, or **GRAMMONT**, Order of. A religious order in France, founded in 1077 by St. Stephen of Thiers (died 1124), who, according to the current legend, after receiving his education in Italy, returned to France and became a rigorous and solitary ascetic. He remained for a long time in a lonely retreat in the Glen of Muret, a short distance east of Limoges; but as the fame of his piety spread his retreat attracted many visitors, and finally a community was formed whose mode of life was characterized by the most severe rules of fasting, silence, and the mortification of the flesh. The order changed its abode to Grandmont, or Grammont, several miles farther to the east, and from this locality it took its name, although its members were popularly known as the "Good Men." By 1170 there were 60 monasteries of this order in France. The severity of its discipline was relaxed by Innocent IV and Clement V in the thirteenth and fourteenth centuries. There was a brief period in which the order flourished, and it continued in existence until the time of the French Revolution. The founder, Stephen of Thiers, was canonized by Clement III in 1189. The annals of the order were published at Troyes in 1662. Consult Heimbucher, *Orden und Kongregationen der katholischen Kirche*, vol. ii (Paderborn, 1907).

GRANDMOUGIN, gräɴ'mo͞o'zhăɴ', Charles (1850–). A French man of letters, born at Vesoul, Haute-Saône. He studied law and was in the office of the War Minister; but his tastes inclined to poetry, and he published his first volume, *Les siestes*, at the age of 23. Five years later his chief work appeared, *Prométhée*, a drama in verse, and another drama, *Orphée*, was performed in 1887. Besides contributing prose and verse to periodical literature, Grandmougin wrote lyrics and librettos for musical composers—Godard, Massenet, Lefèvre, and others—and was himself one of the first French appreciators of Wagner. He also published *Contes d'aujourd'hui* (1887) and assisted in the literary part of the revival of the old passion plays. His *Sang du Calvaire* (1905) and *La mort de Carthage* (1907), two dramatic compositions, have been well received, though they did not add much to his literary reputation.

GRAND OLD MAN. A popular name for William Ewart Gladstone (q.v.).

GRAND PEN'SIONARY. In the days of the Dutch Republic, the State Secretary for the Province of Holland. Until the time of Olden Barneveldt (q.v.), the Grand Pensionary was also Advocate-General for the same province. He had no vote in the Assembly of the Estates and could only bring forward subjects for discussion. He, however, collected the votes, wrote the decrees, read the letters addressed to the States, conducted negotiations with foreign ambassadors and ministers, and took charge of the revenues of the province, of its rights and privileges, and whatever else pertained to its welfare. He was a perpetual member of the States-General of the United Netherlands, and thus, as first magistrate of Holland, the most important of the United Provinces, he acquired immense influence over all the Netherlands and might be considered Premier of the Dutch Parliament. The Grand Pensionary held his office for five years, but was in most cases reëlected. The office was abolished in 1795, after the conquest of the Netherlands by the French.

GRAND-PIERRE, grän'-pyâr', JEAN HENRI (1799–1874). A French Protestant pulpit orator. He was born at Neuchâtel, Switzerland, was educated there and at Tübingen, became pastor of the French church at Basel (1823), and was an intimate friend of Vinet. In 1827 he went to Paris, became president and professor of languages in the theological seminary, and was soon recognized as one of the most eloquent of pulpit orators. His last 20 years were passed as pastor of L'Oratoire, the greatest of the Protestant churches in the French capital. After the death of Adolphe Monod (1856) he was leader of the orthodox branch of the Reformed church. Louis Philippe granted him letters of naturalization, and Louis Napoleon made him a member of the Legion of Honor. He visited the United States twice and in 1850 published *A Parisian Pastor's Glance at America* (Eng. trans., Boston, 1854). He died in Paris, 1874. His sermons on *The Doctrines of the Christian Religion* appeared in London (1844).

GRAND PRÉ, grän prā. A village in King's Co., Nova Scotia, Canada, on the Dominion Atlantic Railroad (Map: Nova Scotia, E 3), 15 miles northwest of Windsor by rail, and separated from Minas Basin by the Grand Pré Dike and Long Island. Pop., 1901, 874; 1914 (local est.), 400. It is notable as the central scene in Longfellow's poem *Evangeline*.

GRAND PRIX DE PARIS, grän prē de pȧ'rē' (Fr., great prize of Paris). The most important event in the French racing calendar. It was first contested in 1863 and corresponds to the English Derby in point of interest and monetary value. The distance is 1 mile, 7 furlongs. The race is run about the middle of June each year and takes place on the famous race course at Longchamp, near Paris. Under the Empire the prize was paid for by the city of Paris; but since 1871 two railroads have paid 25,000 francs each, the city of Paris 50,000, and the sum total of the prize in other ways brought up to a total value of 250,000 francs. Of the first 23 races, about half were won by English horses, but thereafter French horses made a better showing. American horses won in 1881 (Foxhall Keene's Foxhall) and in 1908 (W. K. Vanderbilt's Northeast). In 1899 American methods and jockeys were introduced. The race marks the beginning of the summer season in the fashionable world, after which the regular migration to the seaside or country takes place.

GRAND PRIX DE ROME. See PRIX DE ROME.

GRAND RAP'IDS. A city and the county seat of Kent Co., Mich., 30 miles from Lake Michigan and 60 miles (direct) west by north of the State capital, Lansing, on the Grand River, at the head of steam navigation, and on the Michigan Central, the Lake Shore and Michigan Southern, the Pere Marquette, the Grand Rapids and Indiana, the Grand Trunk, and other railroads; there is direct steamboat connection with Chicago, Milwaukee, and other cities (Map: Michigan, D 6). Grand Rapids was settled in 1833, on the site of an abandoned Indian village, was chartered as a city in 1850, and reincorporated in 1905. It is the seat of Roman Catholic and Protestant Episcopal bishoprics. It has a number of charitable institutions, among them the Butterworth Hospital, Union Benevolent Association Home and Hospital, Women's Home and Hospital, City Home for the Treatment of Contagious Diseases, St. Mary's Hospital, Blodgett Home for Children, Emerson Home, Home for the Aged, Holland Union Benevolent Association Home, and St. John's Orphan Asylum. Here are also the State Soldiers' homes, and, among other prominent structures, the city hall, the county and Federal buildings, Masonic Temple, Pythian Temple, Knights of Columbus Hall, and Elk Hall. The city has also a public library, the Kent Scientific Museum, Reed's Lake, and several public parks.

Grand Rapids is the centre of a region interested largely in agriculture and fruit growing, has extensive gypsum quarries in the vicinity, and is an important commercial city, doing a considerable jobbing business, and carrying on a large trade in pine and hardwood lumber and in manufactured products, particularly furniture. The manufacturing industry is facilitated by the water power furnished by the Grand River, which enters Lake Michigan 40 miles below, and at Grand Rapids it falls about 18 feet, forming the rapids from which the city derives its name. Among the more important manufactures are furniture, lumber products, school seats, flour, carpet sweepers, gypsum products, window-sash pulleys, fly paper, knit goods, refrigerators, calcined plaster, foundry and machine-shop products, carriages and wagons, and agricultural implements.

The government is vested in a mayor, chosen biennially, a unicameral municipal council, and subordinate administrative boards—police, fire, public works, health, poor, and assessors—appointed by the executive. The highway commissioners and building inspector are elected by the council; and the city clerk, city attorney, treasurer, comptroller, and marshal are chosen by popular election. The annual income and expenditures of the city in 1912 amounted to $5,130,000 and $5,557,000 respectively, the principal items of expense being $80,000 for the operation of water works, $147,000 for the police department, $203,000 for the fire department, and $668,000 for education. The city owns its water works and electric-light plant. Pop., 1850, 2686; 1870, 16,507; 1890, 60,278; 1900, 87,565; 1910, 112,571; 1914 (U. S. est.), 123,227.

GRAND RAP′IDS. A city and the county seat of Wood Co., Wis., 91 miles north by west of Madison, on the Wisconsin River, and on the Chicago, Milwaukee, and St. Paul, the Minneapolis, St. Paul, and Sault Ste. Marie, the Chicago and Northwestern, and the Green Bay and Western railroads (Map: Wisconsin, D 4). A fine bridge across the river connects the east and west sides of the city. There are several parks, a hospital, and a public library. The city has a foundry and machine shop and manufactures of lumber, pulp and paper, furniture, hubs and spokes, boxes, wagons, ice machines, flour, etc. The manufactures are promoted by good water power. The local electric, telephone, and water-supply systems are owned coöperatively by the citizens of the city. Pop., 1900, 4493; 1910, 6521.

GRAND REMON′STRANCE. A manifesto presented to Charles I of England by the House of Commons in 1641. The outbreak of the Irish rebellion and the rumored intrigues of the King with the Scottish Earl of Montrose had convinced the leaders of the Puritan party that the hour had come when he must be called to account. Accordingly, on November 22, while Charles was absent in Scotland, the Commons, after a final stormy debate lasting from noon till midnight, adopted a Grand Remonstrance by a majority of 11. The Remonstrance is in character a severe indictment for a long series of acts of alleged misgovernment extending over the King's whole preceding reign. Some of the charges were exaggerated or untrue. The document, of which John Pym was the main author, which was presented December 1, consists of 204 sections, and in it the forced loans and ship money, the billeting of soldiers and the imprisonment of members of Parliament, the enlargement of the royal forests and the abuse of commercial monopolies, the excesses of the courts of Star Chamber, High Commission, and that of the President and Council of the North, with many other grievances, are minutely set forth. As in the Petition, a request is made for the appointment of ministers in whom the Parliament may have confidence, and it is asked that the reform of the Church may be left to a "synod of the most grave, pious, learned, and judicious divines"; but the parliamentary plan contains no suggestion of toleration for those who shall not conform. When first received from the deputation of the Commons, Charles criticized and ridiculed the Remonstrance. On December 10 he issued a proclamation on religion, which he evidently intended as an indirect reply, and on December 23 he issued a lofty and evasive "Answer" to the Petition which accompanied the manifesto. He seemed blind to the supreme danger of his position, and on Jan. 3, 1641–42, sent his Attorney-General to impeach the leaders of the opposition before the House of Lords. For the text of the Grand Remonstrance, consult Gardiner's *Constitutional Documents* (2d ed., Oxford, 1899), and for a discussion, his *History of England*, x, 59–64, 71–79, 88, 108–109 (new ed., New York, 1893–95).

GRAND RIV′ER. One of the head streams of the Colorado River (q.v.). It rises on the west slope of the Front Range of the Rocky Mountains, in the northern part of Colorado, and flows in a general southwest course for about 350 miles, joining the Green River in southeastern Utah to form the Colorado (Map: Utah, E 4). Its main tributaries are the Gunnison and Dolores rivers, both from the south.

GRAND RIVER. A river of Missouri formed by the confluence of its West, Middle, and East forks in Gentry County in the northwestern part of the State. It flows in a generally southeasterly direction and enters the Missouri River at the intersection of Carroll, Chariton, and Saline counties (Map: Missouri, C 2).

GRAND RIVER. A tributary of Lake Michigan. Its head stream, the Portage River, rises in Jackson County and flows nearly due north to Lansing. There the main stream turns to the west and flows generally in that direction to Lake Michigan, which it enters at Grand Haven (Map: Michigan, D 6). It is about 280 miles long and is navigable by steamers 40 miles from its mouth to Grand Rapids, above which place the river falls 18 feet in a mile, furnishing good water power.

GRAND RIVER, or HAM′ILTON RIVER. A river of Labrador, British America (Map: Canada, S 6). It leaves Lake Petitskapow in lat. 54° 35′ N. and long. 64° 50′ W., flowing south through a chain of lakes and over the Grand Falls (q.v.), then continuing east until it enters the Atlantic Ocean through Hamilton Inlet.

GRAND SERGEANTY, sär′jen-tĭ (ML. *magna serjeantia*). The most honorable of the ancient feudal tenures. According to Lyttelton, tenure by grand sergeanty is where a man holds his lands or tenements of his sovereign lord the King by such services as he ought to do in his proper person to the King, as to carry the banner of the King, or his lance, or to lead his army, or to be his marshal, or to carry his sword before him at his coronation, or to be his carver, or his butler, or one of his chamberlains of the receipt of his exchequer, or to do other like services. This tenure must be held directly of the King. Where lands were held of a subject on condition of performance of similar services, the tenure was not grand sergeanty, but knight's service. Tenants holding by grand sergeanty were free from escuage, which usually appertained to knight's service, and in general could only be called upon to perform their services *infra quattuor maria* (within the four seas), i.e., on English soil. They were, however, subject to the more burdensome incident of tenure by knight's service, such as wardship and marriage (qq.v.). The services in grand sergeanty were to be performed by the tenant in person, where he was able to do so. The office of attendance on the sovereign's person was esteemed so honorable that no one below the dignity of a knight could perform it. This tenure by grand sergeanty was by 12 Charles II, c. 24, in common with other military tenures, reduced to common socage (q.v.), except so far as regards the honorary services, which continue to be observed to this day.

In Scotland grand sergeanty was not known as a separate tenure—i.e., lands held on condition of honorary services rendered to the sovereign were not attended with any privileges other than those attaching to lands held in a similar manner of a subject superior, i.e., a mesne lord. In that country a tenure by honorary service was known as a blanch holding. See FEUDALISM; TENURE.

GRAND TOUR. The term applied in the eighteenth century to the tour of France, Germany, and Italy, which formed a part of the education of young men of wealth and fashion.

GRAND TRIANON, trē′ȧ′nôɴ′. See TRIANON.

GRANDVILLE, grăɴ′vēl′ (1803–47). A French illustrator and caricaturist. His name was properly JEAN IGNACE ISIDORE GERARD. He was born at Nancy and was a pupil of his father, a painter and miniaturist. At 20 he went to Paris; in 1828 he published the first of a series of humorous sketches, entitled *Les métamorphoses du jour*, representing human beings with the heads of animals, and in 1840–42 another series, entitled *Les animaux parlants*. After the revolution of 1848 he participated with Daumier and Decamps in *Le Caricature*. His *Convoi de la liberté*, his *Basse cour*, *Mât de cocagne*, etc., as pictures of the politics and manners of the times, are of great and lasting value. When the September laws put an end to political caricature, Grandville used his pencil to satirize the follies and vices of mankind. He also contributed illustrations to new and splendid editions of the *Fables* of Lafontaine and Florian, the *Adventures of Robinson Crusoe*, *Gulliver's Travels*, Hugo's *Vie de Napoléon*, Raybaud's *Jérôme Paturot*, etc. Grandville is remarkable for depth and delicacy of observation and criticism and accuracy in portraiture. Consult Blanc, *Grandville* (Paris, 1855).

GRANE, WILLIAM LEIGHTON (1855–). An English clergyman, born in London and educated at Caius College, Cambridge. He was ordained deacon in 1879 and priest in 1880 of the Church of England, was curate and rector of several parishes, and in 1903 became vicar of Cobham, Surrey. He was select preacher at Cambridge in 1904–05 and Hulsean lecturer in 1913–14. He published: *The Word and the Way* (1894); *Hard Sayings of Jesus Christ* (1899; 2d ed., 1901); *The Passing of War* (1912; 3d ed., 1913).

GRANEL′LA, VICTOR. The pseudonym of the German theologian Wilhelm Tangermann (q.v.).

GRANET, grȧ′nā′, FRANÇOIS MARIUS (1775–1849). A French painter of architectural interiors. He was born at Aix in Provence, and was a pupil of the landscape painter Constantin and of David. In 1802 he went to Italy and remained in Rome until 1816. While he attempted historical subjects at times, Granet was distinctly a painter of architectural interiors, enlivened by small historical or genre figures. His paintings are characterized by remarkable treatment of light effects, which he renders with striking truth. In 1826 he was made custodian of the paintings at Versailles, and in 1830 a member of the Institute. At his death he left his fortune and fine collections to found a museum at Aix. His art is best represented in this museum and in the Louvre, which possesses "Interior of the Coliseum," "The Painter Sodoma Taken to the Hospital," "Interior of the Lower Church of St. Francis of Assisi," "Ransom of Prisoners in Algiers by Redemptorists," and the artist's portrait. Many other French provincial museums possess his works.

GRANGE, grānj (from Fr. *grange*, barn, from Lat. *granum*, grain). The name popularly applied to the Society of Patrons of Husbandry, but in fact denoting the constituent and subsidiary divisions of that organization, as the term "lodge" is used in other fraternal orders. The Patrons of Husbandry is a secret association of farmers, founded at Washington, D. C., Dec. 4, 1867. The chief founder of the society was Oliver Hudson Kelley, a Minnesota farmer, who was deputed by the government in 1866 to make a tour of inspection through the Southern States and to report upon their agricultural conditions and the best means of improving them. The widespread demoralization of the farming population there, as a result of the great Civil War which closed the year before, convinced Kelley that organization was vitally necessary, as well for the farmers' self-protection as for their advancement by the use of scientific methods of cultivation and the enactment of laws favorable to them. Being a Northern man, he was not very warmly received by the people of the South, except by brother Freemasons, which suggested to him the idea of a secret fraternity of farmers. Upon his return to Washington he submitted his plan for a farmers' society to a few friends, who coöperated with him in establishing the National Grange of the Patrons of Husbandry. Kelley and six of his most active associates—William Saunders, J. R. Thompson, A. B. Grosh, John Trimble, W. M. Ireland, and F. M. McDowell—were later officially recognized as "the seven founders of the order." The organization was secret, and membership limited to those actually engaged in agriculture. It was at the suggestion of Miss Carrie A. Hall, a niece of Kelley and a Boston school-teacher, that women were admitted on an equality with men; and this feature, novel at the time, had much to do with the society's rapid growth and permanence.

The constitution provided for local or subordinate, district or Pomona, State, and national granges for the conferring of degrees and for the transaction of the business of the order. Chiefly through the efforts of Kelley, who was a zealous promoter, the society after a few years gained rapidly in members and influence. In 1873 there were 13,000 subordinate granges, and in 1875 the total membership reached 1,500,000. At about this time the Grange became prominently identified with legislative matters, both State and national, intended to curb railroads and monopolies, to prevent discrimination in rates and prices, and to advance the farmers' interests educationally, socially, and financially. The Grange is a nonpolitical order and makes its appeals to legislatures and Congress in the interest of agriculture, in a spirit of fairness, and for the common welfare. It was largely instrumental in securing the passage of the Interstate Commerce Act, the oleomargarine law, the Hatch Act founding experiment stations, the law making the head of the Department of Agriculture a cabinet officer, rural mail delivery, postal-savings-bank law, the parcel-post law, and many other State and national laws which show a broad-minded statesmanship. The Grange also endeavored to gain control of elevators, warehouses, and terminal facilities, and instituted coöperative buying and selling on a large scale for the benefit of its members. The public, not easily distinguishing the official acts of the Grange from the efforts and purposes of the farmers generally, came to designate the whole class as Grangers, and their legislative ends and all efforts at farmer organization as the *Granger movement.* In 1873–74 many legislative efforts were made to regulate and control freight and passenger rates on the railroads, which assumed special importance in Illinois, Iowa, Minnesota, and Wisconsin, in which the Grange was a considerable factor; and "it is not too much to say that the fundamental principles upon which American regulation of railroads by legislation has developed were first worked out by the Granger States of the Northwest during the decade of the seventies." It is from this legislation that some of the railroads of the Northwest are still referred to as Granger railroads.

From a number of causes, none of them very clearly defined, the Grange began to decline the last months of 1873, and by 1876 and following the closely contested political campaign of that year and the unsettled condition preceding the settlement of the contest in favor of President Hayes, the Grange reached a condition of rapid disintegration. With a strong, well-disciplined leadership in many States and the National Grange, it survived through the decade of the eighties. About 1890 it began to take on new life and once more took an active part in every movement for agricultural betterment. Many dormant granges were reorganized, and slowly but surely it has gained in numbers and influence for the last 20 years. On June 30, 1914, there were strong State granges in 32 States, with a paid-up membership of approximately 600,000, with probably as many others more or less delinquent. The National Grange now has a permanent invested accumulation of more than $100,000, which gives it a guarantee of financial soundness. In recent years it has been an important factor in securing much State and national legislation in the interest of agriculture. Its social and educational aspects have been greatly magnified, and its legislative and coöperative policies readjusted in accord with sound economic principles; and it promises, though with a smaller membership than it once had, to remain a permanent institution. Consult: *Popular Science Monthly*, vol. xxxii (New York, 1888); *Annals of the American Academy of Political and Social Science*, vol. iv (Philadelphia, 1893); *New Jersey Labor Statistics* (1886); Buck, *Granger Movement* (Cambridge, Mass., 1913).

GRANGEMOUTH, grānj′mŭth. A seaport town and police burgh in Stirlingshire, Scotland, on the Firth of Forth, at the mouth of the Carron, 2½ miles northeast of Falkirk (Map: Scotland, E 3). It has a fine harbor with good docks covering 121 acres and carries on a large continental and coasting trade. Its imports consist of iron ore, timber, and pig iron, while its exports include produce, coal, and worked iron. There are shipbuilding and supplemental industries, iron, brick, and tile works, and coal mining. The town owes its existence to the construction of the Forth and Clyde Canal, opened in 1789, of which it is the eastern terminal. Pop., 1901, 8386; 1911, 9840.

GRAN′GER, grān′jẽr, FRANCIS (1792–1868). An American politician, born at Suffield, Conn., the son of Gideon Granger (q.v.). He graduated at Yale in 1811 and in 1814 began the practice of law with his father in Canandaigua, N. Y. In 1825 he was elected from Ontario County to the State Legislature and with William H. Seward, Thurlow Weed, and others, took a prominent part in the Antimasonic movement. In 1826 he was reëlected to the Legislature and in 1827 was a delegate to the famous Protectionist convention at Harrisburg, Pa. In 1828 he was nominated by the Antimasonic party for Governor, but declined, as he had accepted the nomination of the Adams Democrats for Lieutenant Governor on their ticket. He was one of the most active promoters of the new Whig party in 1834 and in the State convention of that year was one of its candidates for the nomination as Governor, which, however, was secured by Seward. In the fall of the same year he was nominated and elected to Congress. Granger was reëlected to the Twenty-sixth Congress in 1838 and in March, 1841, entered Harrison's cabinet as Postmaster-General, the office his father had held under Jefferson and Madison. He was confirmed after some objection on the part of the Southern senators, who suspected him of antislavery proclivities; but after Harrison's death and the break between Tyler and the Whigs, he resigned. He again served in Congress in 1841–42, but at the end of his term retired and never again held public office. He continued to take an active interest in politics, however, supported Webster in his stand on the compromise measures of 1850, and headed the revolt in the Whig convention at Syracuse, N. Y., in that year, the participators in which are said to have taken their name of Silver Grays (q.v.) from the flowing white locks of Granger and some of his conservative companions. He was in sympathy with the Know-Nothing movement in 1853–56 and is said to have advised its leaders, but he never supported it openly. In 1861 he was a member of the Peace Convention at Washington.

GRANGER, GIDEON (1767–1822). An American politician, for 13 years Postmaster-General of the United States. He was born at Suffield, Conn., graduated at Yale in 1787, studied law and was admitted to the bar, and was elected to the Connecticut Assembly, where he became one of the most influential Anti-Federalist leaders in the State. He is said to have originated the Connecticut school fund. When Jefferson was elected to the presidency, he recognized the necessity of revolutionizing the Federalist character of New England and with this end in view in 1801 appointed Levi Lincoln Attorney-General, Henry Dearborn Secretary of War, and Gideon Granger Postmaster-General. The last was not then a cabinet officer, but his patronage was exceedingly large, and there was no requirement that his appointments be confirmed by the Senate. Granger's position enabled him to keep in touch with political affairs in every part of the country, and his principal services to Jefferson were of a personal nature in apprising him of the machinations of the politicians and the trend of popular feeling. It was he who in 1804 scented Burr's conspiracy with the Federalists. In the same year, while retaining his Federal office, he became agent for the New England Mississippi Company and openly lobbied for the compromise of the Yazoo Claims on the floor of the House. Granger continued to hold office under Madison until 1814, when his alliance with the Giles-Leib faction, and his appointment of Leib as postmaster at Philadelphia, in the face of the President's opposition, led to his removal from office. Later he settled in New York, where he served several terms in the Legislature and became a follower of De Witt Clinton.

GRANGER, Gordon (1821–76). An American soldier, born in Wayne Co., N. Y. He graduated at West Point in 1845 and was an officer in General Scott's army during its campaign from Vera Cruz to the city of Mexico. He was given the brevet rank of captain for his services during the Mexican War and at its conclusion was assigned to duty on the southwestern frontier. At the outbreak of the Civil War he was sent to Ohio to muster in volunteers, but soon afterward was ordered to southern Missouri, where he was engaged in several actions. During the early part of April, 1862, he commanded the Third Brigade of the Army of the Mississippi at the capture of Island Number 10, and during the following campaign he commanded the cavalry in the Army of the Mississippi. At the battle of Chickamauga the next year he commanded the reserve. He commanded the Fourth Corps in the battle of Missionary Ridge and was then sent to the relief of Knoxville. During the last two years of the war he was engaged in the military operations in the Gulf States, which finally terminated in the capture of Mobile. On Jan. 15, 1866, he was mustered out of the volunteer service with the rank of major general of volunteers and the brevet rank of major general in the regular army, and in the following July he was commissioned colonel of the Twenty-fifth Infantry.

GRANGER, James (1723–76). An English biographer, print collector, and preacher. He was entered at Christ Church, Oxford, in 1743, but took no degree. Having taken orders, he received the living of Shiplake, Oxfordshire. He was liberal in politics and brought on himself the wrath of Dr. Johnson for a Whig in orders. In 1773, with Lord Mountstuart, later Earl of Bute, he toured Holland and made great addition to his store of portraits. He died of apoplexy, which seized him while he was administering the sacrament. His main work is *Biographical History of England . . . Adapted to a Methodical Catalogue of Engraved British Heads, with a preface, showing the utility of a collection of Engraved Portraits* (1769; last ed., 1824). This work, continued from Granger's manuscripts by the Rev. Mark Noble (1806), gave rise to the mutilation of books containing engraved portraits for the purpose of superillustration and to the terms "grangerism" and "grangerize" therefor. Two of Granger's sermons were published, *An Apology for the Brute Creation* (1772) and *The Nature and Extent of Industry* (1775). Granger's letters, "composing a copious history and illustration of the biographical history of England," were edited by J. P. Malcolm (1805).

GRANGER, Robert Seaman (1816–94). An American soldier, born in Zanesville, Ohio. He graduated at West Point in 1838 and served in the Seminole and Mexican wars, in which he attained the rank of captain. On April 27, 1861, he was captured by the Confederates with Major Sibley's command on the coast of Texas was released on parole, and was not exchanged until August, 1862. On Oct. 20, 1862, he was made brigadier general of volunteers. In 1864 he took part in the capture of General Roddy's camp near Courtland and later aided in driving General Wheeler from middle Tennessee. In October of the same year he was engaged in protecting that district during Forrest's raid and in the defense of Decatur against Hood's army. He was brevetted major general in the regular army on March 13, 1865, and soon afterward was commissioned lieutenant colonel of the Eleventh Infantry. In 1871 he was promoted to the rank of colonel and in 1873 was retired from active service upon his own application.

GRANGER CASES. A series of cases decided by the Supreme Court of the United States in 1876 and reported in 94 United States Reports at pp. 113–187, inclusive. Their several titles are as follows: Munn *v.* Illinois; Chicago, Burlington, and Quincy Ry. *v.* Iowa; Peik *v.* Chicago and North Western Ry.; Chicago, Milwaukee, and St. Paul Ry. *v.* Ackley; Winona and St. Peter Ry. *v.* Blake; and Stone *v.* Wisconsin. In his dissenting opinion Mr. Justice Field designated the entire group as the "Granger cases"—a name which has clung to them ever since, although neither the Patrons of Husbandry, nor any grange or lodge of that association, nor any of its members or grangers, had any connection with these litigations.

The general principle deducible from these decisions has been stated in these words: "Whenever any person pursues a public calling, and sustains such relations to the public that the people must, of necessity, deal with him, and are under a moral duress to submit to his terms, if he is unrestrained by law, then, in order to prevent extortion and an abuse of his position, the price he may charge for his services, or use of his property, may be regulated by law." Applying this principle to the cases then before the court, it was held that a statute of Illinois was constitutional which prescribed maximum rates for the storage of grain in elevators, and prescribed penalties for charging higher rates than those named in the law. In the various railroad cases the court held that railroad companies are engaged in a public employment; that their property is thereby "affected with a public interest, and no longer *juris privati* only"; that it has been devoted by them to a use in which the public has an interest; that by such conduct they have in effect granted to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest thus created; that they may withdraw their grant by discontinuing the use, but that so long as they maintain the use they must submit to the control.

The doctrine of these cases has been approved by many State courts. In Maine it was applied in sustaining the constitutionality of a statute prescribing the maximum tolls to be charged by the owner of a public grist mill. The court in that case said: "In the absence of government aid, the individual proprietor, not pretending to serve the public, might maintain such mills as private mills, free from legislative interference, precisely as he might maintain a store, shop, or other private business; but when he makes his mill public and attempts to serve the public, then he dedicates his mill to public use, and it becomes subject to public regulation and control."

It is admitted by all courts that the doctrine of the Granger cases does not authorize the legislature to destroy or confiscate property, even when it is affected with a public use, under guise of regulating rates or tolls. Statutes imposing unreasonable regulations, or having the object of taking private property for public use without compensation, have been declared unconstitutional. Consult Hare, *American Constitutional Law* (2 vols., Boston, 1889).

GRANGERISM. See GRANGER, JAMES.

GRANGERS. See GRANGE.

GRANI′CUS (Lat., from Gk. Γράνικος, *Granikos*). The ancient name of a small river in Troas, in the northwestern part of Asia Minor, flowing from the northern side of Mount Ida to the Propontis and now known as the Kodja-su. The Granicus is celebrated as the scene of the first victory gained by Alexander the Great (q.v.) over the Persians after he crossed the Hellespont 334 B.C. and of a victory by Lucullus over Mithridates in 74 B.C.

GRANIER DE CASSAGNAC, grȧ′nyȧ′ de kȧ′sȧ′nyȧk′, ADOLPHE (1808–80). A French Bonapartist and journalist, born in Averon-Bergelle. He went to Paris in 1832. His first work was as a literary critic. He enthusiastically espoused the cause of the Romanticists, and his attack on Racine stirred up all Paris. He abandoned literature for politics in 1840, in which year he made a political voyage to the Antilles. In 1845 he started the ultra-Orleanist Journal *L'Epoque.* After the revolution of 1848 he left Paris. He returned in 1850 as a Bonapartist and became editor of the *Pouvoir.* During the Empire he was a Bonapartist member of the French legislative body and a passionate Conservative. In 1857 he founded with Barbey d'Aurevilly the short-lived *Le Réveil.* He was connected with other journals in the interest of Napoleon, becoming in 1866 the editor in chief of the violent *Le Pays,* with his son Paul as assistant. His polemical career during this decade was marked by sensational duels, lawsuits, affairs with the police, and other evidences of indiscreet zeal. After the fall of the Empire he started *Le Drapeau* in Brussels. In 1876 he was once more chosen as an anti-Republican national deputy. He died Jan. 31, 1880. His works include two mediocre novels, also travels (*Voyage aux Antilles*), and his *Souvenirs du Second Empire.* His most noteworthy compilations are his histories: *Histoire des classes ouvrières et des classes bourgeoises* (Paris, 1837); *Histoire du Directoire* (1851–63); *Histoire des Girondins et des massacres de septembre* (1860); *etc.* They lack calm judicial qualities and the result of impartial study and investigation, but are characterized by journalistic vigor and graphical power.

GRANIER DE CASSAGNAC, PAUL (1843–1904). A French author and journalist, born in Paris, son of the preceding. He began his literary life by writing for *Le Pays.* He took part in the War of 1870–71 and then returned to journalism. In 1874 *Le Pays* was suspended on account of M. de Cassagnac's violent articles. In 1876 he was elected to the Chamber of Deputies and served in that body continuously till 1893 and again after 1898. He was known as one of the bitterest opponents of the existing order of things in France. After the death of the Prince Imperial, in 1879, De Cassagnac supported Prince Victor Napoleon, and to assist his Imperialistic ideas founded a new journal, *L'Autorité.* His aggressive temperament and caustic pen involved him in numerous duels. He wrote, in collaboration with his father, *Histoire populaire abrégée de Napoleon III* (1874–75). His own works include *Empire et royauté* (1873), *Mémoires de Chislehurst* (1873), and the posthumous *Principaux articles et discours* (1905).

GRAN′ITE (It. *granito,* granite, grained, from *granire,* to reduce to grains, from *grano,* Lat. *granum,* grain; connected with Goth. *kaúrn,* Icel., OHG. *korn,* Ger. *Korn,* grain, AS., Eng. *corn*). An igneous rock or family of rocks characterized by acid composition and granitic texture (see IGNEOUS ROCKS), composed of feldspar (microline, orthoclase, albite, or their mixtures) and quartz, with usually mica (biotite or muscovite) or hornblende, rarely pyroxene. Other minerals are usually present in less abundance, as lime-soda feldspar, magnetite, ilmenite, sphene, zircon, apatite, etc. The range of composition of granite is as follows:

SiO_2	66.28–77.68	CaO	.12–3.75
Al_2O_3	11.63–16.38	Na_2O	2.85–5.16
Fe_2O_3	.00– 2.73	K_2O	1.87–5.16
FeO	.09– 1.88	TiO_2	tr.– .54
MgO	.04– 1.63	P_2O_5	tr.– .30

In texture granite is an even granular to porphyritic rock. Feldspars form the phenocrysts in some. When the granite takes on a foliated or banded structure after its crystallization, it is called a *granite gneiss.*

Granites are classified into muscovite granite, muscovite-biotite granite, hornblende granite, and augite granite, the first portion of the name generally indicating the mineral or minerals which with quartz and potash feldspar make up a large part of the rock's substance. *Aplite* is a name formerly applied to granites poor or lacking in mica, and now used for fine-grained, muscovite granites, occurring in dikes. *Pegmatite* is a variety of granite, usually coarse-textured, and containing quartz, feldspar, and mica, with frequently rarer minerals, occurring in dikes or veins. *Graphic granite* is a pegmatite in which the quartz and feldspar are intergrown in such a way as to resemble cuneiform characters on the cross fracture. By loss of the constituent mineral quartz granite grades into syenite (q.v.); by reduction of the amount of potash feldspar and gain in the proportion of lime-soda feldspar it passes into diorite (q.v.), an intermediate variety being known as *grano-diorite.* Augite diorites by a similar change pass into gabbro. These transitions are mentioned, not alone to show the relationships which exist between the different families of igneous rocks possessing granitic texture, but because they indicate transitions frequently observable within the same rock mass. Important variations in the relative proportions of the several mineral constituents of a rock within the same mass are, in fact, the rule rather than the exception, so that it is difficult to delimit with any sharpness the several types.

In an earlier period of development of the science of geology, the question respecting the origin of granites was debated with great warmth by the rival schools of England and Germany. Hutton (q.v.) and his followers maintained that granites were formed from fusion and consolidation, whereas Werner and the Freiberg school of geologists, with even greater assurance, advocated the chemical precipitation theory of its formation. Time has shown the correctness of the view held by Hutton, though his theory has been modified in important ways. Granites are plutonic rocks that have cooled at great depths below the surface. They form large irregular masses, known as batholiths, also as rounded exposures in other rocks (stocks or bosses), and as dikes. Granite is usually some shade of gray, but pink and red are not uncommon colors. The specific gravity ranges from 2.63 to 2.75. The absorption is small, usually under 1 per cent, and crushing strength from 15,000 to 20,000 pounds per square inch.

Granite is an important building stone. It is much harder to quarry and tool than are sandstone, limestone, and marble, but has greater strength; the best grades are extremely resistant to weathering. Consult: Merrill, *Stones for Building and Decoration* (New York, 1903); Kemp, *Handbook of Rocks* (ib., 1906); Pirsson, *Rocks and Rock Minerals* (ib., 1908); Iddings, *Igneous Rocks* (ib., 1909); Ries, *Building Stones and Clay Products* (ib., 1912). See BUILDING STONE.

GRANITE CITY. A city of Madison Co., Ill., near the Mississippi River, opposite St. Louis, Mo., on the Chicago and Alton, the Chicago, Peoria, and St. Louis, the Cleveland, Cincinnati, Chicago, and St. Louis, the St. Louis Merchants' Bridge Terminal, the Wabash, and other railroads (Map: Illinois, D 8). It produces iron, steel, tin plate, and granite ware, and has a large corn-products refinery, bridge works, and an extensive sheet-lead mill. The city contains a public hospital. Settled in 1892, it is governed under a charter of 1896 by a mayor and council elected every two years. Pop., 1900, 3122; 1910, 9903; 1914 (U. S. est.), 13,647.

GRANITE STATE. New Hampshire. See STATES, POPULAR NAMES OF.

GRANIT′IC TEX′TURE. See IGNEOUS ROCKS.

GRA′NIUS LICIN′IA′NUS. A Roman historian of the second century A.D., who wrote on the Republican period. Fragments of his works were found in 1853 on a Syrian palimpsest by Paul de Lagarde. It was deciphered and published by Pertz, as *Grani Liciniani quæ supersunt* (1857), and again in 1858 by seven professors at Bonn, as the *Editio Philologorum Bonnensium Heptas*. The work, though uncritical, was used by later Roman authorities. Consult Dieckmann, *De Granii Liciniani Fontibus et Auctoritate* (Berlin, 1896), and Teuffel, *Geschichte der römischen Litteratur*, vol. iii (6th ed., Leipzig, 1913).

GRANMICHELE, grän′mė-kā′lȧ. See GRAMMICHELE.

GRANNY KNOT. See KNOTTING AND SPLICING.

GRAN REUNIÓN AMERICANA, grän rȧ-o͞o-nė̄-ōn′ ȧ-mā′rė̄-kä′nȧ, or **LOGIA AMERICANA,** lō′ʜyȧ ȧ-mā′rė̄-kä′nȧ. A secret society modeled on Masonic lines and founded in London, about 1797, for the purpose of revolutionizing and securing the independence of Spanish America. Little is known respecting this society, but it is generally supposed to have been founded by Francisco de Miranda (q.v.), who was its Grand Master and moving spirit. Analogous and possibly affiliated organizations existed in Paris, known as the Junta de las villas y provincias de la América del Sur, and in Spain, especially at Cadiz, in Buenos Aires and possibly in other parts of South America, under the name Logia de Lautaro or Caballeros racionales. The membership of the Gran Reunion was made up of Spanish-American creoles in Europe, who swore to work for independence and made a profession of republican doctrines. Its period of activity lasted until 1812, when Miranda returned to Venezuela actively to put in force the doctrines of the society there. Among its members, who took the oath before the precursor of Spanish-American independence, were many of the revolutionary leaders, including O'Higgins of Chile, Montúfar and Rocafuerte of Quito, Manteagudo of Peru, Servando Teresa Mier of Mexico, Bolívar of Venezuela, and San Martín, Alvear, and Zapiola of Buenos Aires. These last three were, in 1812, the founders of the Logia de Lautaro in Buenos Aires, which exercised a notable influence on the revolutionary movement in the provinces of La Plata.

Bibliography. W. S. Robertson, *Francisco de Miranda* (Washington, 1909); J. Mancini, *Bolívar et l'émancipation des colonies espagnoles* (2d ed., Paris, 1912); B. Mitre, *Historia de San Martín* (Buenos Aires, 1907); id., *Historia de Belgrano* (5th ed., ib., 1902).

GRAN SASSO D' ITALIA, grän säs′sȯ dė-tä′lya (It., Great Rock of Italy). A group of mountains in central Italy, the highest of the Apennines, having their greatest height in Monte Corno (9580 feet), commanding an extensive view (Map: Italy, D 3). The Gran Sasso can be ascended without great difficulty in summer and autumn from Aquila, and less conveniently from Teramo, but in spring the snow makes climbing difficult. At Campo Pericoli (7220 feet) is a refuge, built by the Italian Alpine Club. Consult Abbate, *Guida al Gran Sasso d' Italia* (Rome, 1888), and Crugnola, *La Vegetazione al Gran Sasso d' Italia* (Teramo, 1894).

GRANT (OF. *grant*, *graunt*, *creant*, *crant*, from Lat. *credere*, Skt. *śraddhā*, to trust; probably influenced by folk etymology with OF. *garantir*, to guarantee). In English and American law, the conveyance of real property by deed, or the instrument by which such conveyance, or transfer of title, is effected. Originally the term "grant" was confined to the conveyance of incorporeal hereditaments, such as easements, profits *à prendre*, and future estates (q.v.), which, not being of a tangible character, i.e., not based upon the possession of the land, were not capable of being transferred by the common-law mode of livery of seisin, by which corporeal interests were conveyed. The former were accordingly said to "lie in grant," whereas the latter lay "in livery." (See FEOFFMENT; LIVERY OF SEISIN.) In order to complete the conveyance of a reversion or remainder by grant, it was necessary that the tenant of the particular estate should acknowledge the grantee by attornment (q.v.). A grant was always effected by a deed. The deed of grant was the simplest of all deeds. When conveyance by livery of seisin was abolished, the grant was generally substituted as the mode of creating or conveying real estate, whether corporeal or incorporeal. This tendency to the substitution of a simple deed for the more ceremonious forms of conveyance of the older law was favored by the provision of the Statute of Frauds, which required all conveyances of land to be in writing. At the present time the deed of grant, as a mode of conveying interests in real property, is generally authorized by statute in England and the United States, though it is usually provided that deeds of bargain and sale and of lease and release may also be used. See CONVEYANCE; DEED.

GRANT, SIR ALEXANDER (1826–84). An English writer and principal of Edinburgh University, eighth Baronet of Dalvey. His father had married while in the West Indies, and Sir Alexander was born in New York, but was sent to England for his education. He distinguished himself at Harrow and Oxford and studied for the bar, but began literary work with a textbook, *The Ethics of Aristotle* (1857). Two years later he married the daughter of Professor Ferrier, of St. Andrews, and went to India, where he made his mark as an educator, eventually becoming vice chancellor of Bombay University and director of public instruction for that presidency. In 1868 he returned to Britain and was elected principal of the University of Edinburgh, which at once felt the influence of his energetic public spirit. His largest work is *The Story of the University of Edinburgh during its First Three Hundred Years* (1884); but a number of his lectures have been published, and he wrote articles upon educational subjects for the leading reviews.

GRANT, ANNE (MACVICAR), best known as "Mrs. Grant of Laggan" (1755–1838). A Scottish writer. She was born in Glasgow, the daughter of Duncan Macvicar, a British officer, who was stationed in 1758 at Albany, N. Y. There she became a favorite with the Schuylers and other prominent families and remained until 1765, when her father settled on a grant of land in what is now Vermont. Three years later they returned to Scotland, secure as they supposed in the possession of the American estate. This, however, was confiscated during the Revolution, and the family was dependent upon the father's pay as barrack master at Fort Augustus. Anne married the Rev. James Grant, chaplain of the fort, and subsequently minister of Laggan. Left a widow in destitute circumstances, she published, by subscription, a volume of *Poems* (1803), and *Letters from the Mountains* (1803), which was exceedingly popular. In the United States she is best known by her *Memoirs of an American Lady, with Sketches of Manners and Scenes in America* (1808; reprinted, New York, 1903), which was republished with a memoir by J. G. Wilson in 1876. It gives an interesting account of manners and customs in northern New York before the Revolution. She published also *Essays on the Superstitions of the Highlands* (1811). In 1826 Scott, Mackenzie, and other friends procured for her a pension of £100 a year. Consult *Memoir and Correspondence of Mrs. Grant of Laggan*, ed. by her son, J. P. Grant (3d ed., Edinburgh, 1853).

GRANT, ASAHEL (1807–44). An American foreign missionary. He was born at Marshall, N. Y., Aug. 17, 1807, studied medicine at Pittsfield, Mass., and practiced in Utica, N. Y. In 1835 he went as missionary of the American Board of Persia, settled at Urumiah, and did much work as physician and founder of schools among the Nestorians there and elsewhere. He died in Mosul, Turkey, April 24, 1844. He published *The Nestorians* (1841). For his life, consult Lathrop (New York, 1847), and Laurie, *Grant and the Mountain Nestorians* (Boston, 1853).

GRANT, CHARLES, LORD GLENELG (1778–1866). A British administrator. He was the son of Charles Grant, a director of the East India Company, and was born at Kidderpore in Bengal, Oct. 26, 1778. He went to England in 1790, was educated at Magdalene College, Cambridge, and in 1867 was admitted to the bar, but never practiced. In 1811 he was elected to Parliament from Inverness and remained a member of the House of Commons till 1835, when he was raised to the peerage as Baron Glenelg. He was one of the Lords of the Treasury from 1813 to 1819 and was Secretary for Ireland from 1819 to 1823. From 1823 to 1827 he was Vice President of the Board of Trade, in 1828 he became President of the Board of Trade and Treasurer of the Navy, and from 1830 to 1834 he was President of the Board of Control of the East India Company. In 1835 he was made Colonial Secretary and held this office until 1839, displaying, however, such remarkable inefficiency as to arouse the opposition of even his fellow ministers, whose insistence led to his resignation. The disturbed condition of Canadian politics during this period, culminating in the rebellion of 1837 (see CANADA), was attributed largely to his vacillating policy. Grant was, nevertheless, an accomplished speaker and in the management of Irish and Indian affairs had shown much ability. He died at Cannes, France, April 23, 1866.

GRANT, DIGBY. A society villain, in Albery's *The Two Roses;* a rôle often successfully played by Henry Irving.

GRANT, FREDERICK DENT (1850–1912). An American soldier, a son of Gen. Ulysses S. Grant, born in St. Louis, Mo. As a child of 12, he was with his father during several battles of the Civil War and was wounded at Vicksburg. He graduated at West Point in 1871 and was assigned as second lieutenant to the Fourth Cavalry. For a time, on leave of absence, he was a civil engineer with the Union Pacific Railway. In the expeditions against the Indians, from 1873 to 1879, he served under General Sherman; in 1881 he resigned from the army. He was appointed United States Minister to Austria by President Harrison in 1889 and was police commissioner of New York from 1894 to 1898. At the beginning of the Spanish-American War he reëntered the army as colonel of the 144th New York Volunteer Infantry, in 1898 was appointed brigadier general United States Volunteers, and during the war served in Porto Rico and in the Philippine Islands. Afterward he was put in command of the Military District of San Juan, Porto Rico, and for almost two years was in command of the District of Cavite and Northern Luzon, Philippine Islands; in 1902 was placed in command of the Department of Texas, later of the Department of the Lakes, and the Department of the East; and became major general in 1906. He died April 12, 1912, of cancer, the same disease to which his father succumbed.

GRANT, GEORGE MONRO (1835–1902). A Canadian author, orator, and educationist, born at Albion Mines, Nova Scotia. He graduated at Glasgow University (1857), entered the ministry of the Presbyterian church in 1860, and occupied a pastorate in Halifax, Nova Scotia, from 1863 to 1877. It was during this time that he wrote his first book, *Ocean to Ocean* (1873), the narrative of his journey overland to British Columbia with Sir Sandford Fleming (q.v.). In 1877 he was made D.D., and left his Halifax church to be principal of, and professor of theology in, Queen's University, Kingston, Ontario. Already famed as a preacher and as an advocate of the union of British America into the Dominion of Canada, he became a forcible and eloquent speaker upon both ecclesiastical and national politics and used his great influence in promoting the union of the Presbyterian churches and in propagating the Imperialist sentiment among the rising generation. He wrote, in the same cause, *Advantages of Imperial Federation* (1889) and *Our National Objects and Aims* (1890). In 1889 he became moderator of the General Assembly of the Presbyterian Church in Canada. In 1891 he was elected president of the Royal Society of Canada. He was a delegate to several Pan-Presbyterian councils. His *Religions of the World in Relation to Christianity* (1894) evidences his breadth of mind. He published also: *New Year Sermons* (1865–66); *Reformers of the Nineteenth Century* (1867); *Our Five Foreign Missions* (1887); *The Religions of the World* (1895); *French-Canadian Life and Character* (1899); and he edited *Picturesque Canada* (1882), the best illustrated work printed in Canada up to that year.

GRANT, Hugh John (1858–1910). An American public official and capitalist, born in New York City. He was educated in Berlin, at St. Francis Xavier College, New York, and at the Columbia Law School. He was a Tammany alderman in 1883 and 1884, but attracted attention by his opposition to the fraudulent granting of street railway franchises by the board of aldermen. Defeated for the mayoralty in 1884, he was elected in 1888 and reëlected in 1890, but in 1894, when again a candidate, was defeated by William L. Strong. While in office he compelled the street railways to take down their overhead wires and place them in subways; when companies refused to obey his order, he set gangs of laborers to cut down the poles and wires. Grant had large business interests to which he devoted himself after 1894.

GRANT, James (1720–1806). A British soldier, born at Ballindalloch, Banffshire, Scotland. He obtained a commission in the English army in 1741 and participated in campaigns in Flanders (1747–48) and later in Ireland. At the outbreak of the French and Indian War he came to America as a major. He was defeated in an attempt to reconnoitre Fort Duquesne in 1758; he was made Governor of East Florida in 1760; again in 1761 he conducted a campaign against the Cherokee Indians, in which there was friction between him and the South Carolina militia. During the Revolutionary War he participated in the battles of Long Island, Brandywine, and Germantown. By successive promotions he rose to the rank of general in 1796.

GRANT, James (1822–87). A Scottish author, born in Edinburgh. After a six years' life in Newfoundland, where his father had a military command, he returned to England in 1839 and in 1840 became an ensign in the Sixty-second Regiment. In 1843 he left the service and spent several months in the office of an architect. His literary tastes soon led him to writing, and in 1845 appeared his first novel, *The Romance of War*. His industry was unflagging, and, besides his historical writings, he published more than 50 works of fiction. They have all a military or an historical setting and are full of color and movement. He founded and was the secretary of the National Association for the Vindication of Scottish Rights and attained a reputation for wide military knowledge which often led to consultation with government authorities. His works on history include: *Memoirs of the Castle of Edinburgh* (1850); *Memoirs of Montrose* (1858); *The Cavaliers of Fortune, or British Heroes in Foreign Wars* (1859); *British Battles on Land and Sea* (1873–75); *Illustrated History of India* (1876); *Old and New Edinburgh* (1880); *History of the War in the Soudan* (1885–86); *Scottish Soldiers of Fortune* (1889). His most recent novels are: *Playing with Fire* (1887); *Love's Labor Won* (1888).

GRANT, Sir James Alexander (1830–). A Canadian physican. He was born in Inverness-shire, Scotland, but was brought by his parents to Canada when he was only one year old. Educated at Queen's University, Kingston, and at McGill, where he graduated in medicine in 1854, he began the practice of medicine at Ottawa, rose rapidly in his profession, and in 1865 became consulting physician to the Governor-General, Lord Monck, a position which he continued to hold under Lord Monck's successors until 1905. Although an active medical practitioner, he became interested in politics and was an influential Conservative member of the House of Commons in 1865–73 and in 1892–96. During his first parliamentary term he introduced the original bill for the construction of the Canadian Pacific Railway. He early advocated the acquisition of British Columbia and the Northwest Territories of Canada. In 1895 he supported a parliamentary motion for the extension of the Dominion franchise to women. He was elected president of the Ontario Medical Council in 1868 and later president of the Canada Medical Association. Grant received many other honors in recognition of his eminence as a physician, among them being the gold medal of the Associazione dei Benemeriti Italiani of Palermo and membership in the Italian Legion of Honor, the American Academy of Medicine, and the British Medical Association. In 1887 he was vice president of the Medical Congress of the World at Washington, D. C., and in the same year he was made a K.C.M.G. He was also president of the Royal Society of Canada. He made many contributions to medical periodical literature and also wrote on geological subjects. He published *Tuberculosis and the Simpler Life* (1906) and *How to Live a Hundred Years* (1908).

GRANT, James Augustus (1827–92). An African explorer, born at Nairn, in Nairnshire, Scotland. He was educated at Marischal College, Aberdeen, and in 1846 entered the army in India, where he saw active service and was wounded during the relief of Lucknow. He met John H. Speke (q.v.) in 1847, and, the similarity of their tastes drawing them to each other, Speke cordially accepted Grant's offer to accompany him when he set out on his second African journey in 1860. Speke retained undivided command of the expedition, so that to him the credit due a commander must be given; but Grant's loyalty, unselfishness, and enthusiasm contributed in large measure to its success, and his notes and collections proved of the greatest value. In 1868 he took part in the Abyssinian expedition, and in May of the same year retired from the army with the rank of lieutenant colonel. Grant's gazelle, one of the largest and handsomest of that family in Africa, was named in his honor. He published the record of his experiences under the title *A Walk across Africa* (1864).

GRANT, Sir James Hope (1808–75). A British soldier, born in Perthshire, Scotland. He served through the first Chinese War and then went to India, where he took part in the Sutlej campaign of 1845–46 and the Punjab campaign of 1848–49. During the Sepoy Mutiny (1857–58) he bore a conspicuous part in many of the more important engagements, notably the battle of Cawnpore, the storming of Delhi, and both the first and the second reliefs of Lucknow—services which earned him the rank of major general. At the outbreak of the second Chinese War, in 1860, he was given command of the British forces and, in spite of the lack of coöperation on the part of the French, brought the struggle to a successful conclusion by the capture of Peking. The next year he was raised to the rank of lieutenant general and in 1862 was made commander in chief at Madras. In 1870 he was appointed commander of the camp at Aldershot, where, in spite of bitter opposition, he succeeded in introducing the Prussian system of army manœuvres. He was a patron of Lord Wolseley, whose ability he was one of the first to recognize, and to whose radical schemes he often lent his influence.

GRANT, Sir Patrick (1804–95). A British soldier. He was born in Scotland, entered the military service of the East India Company in 1820, and served for many years with distinction in India. In 1856 he was appointed commander in chief of the Madras army, and in 1857, at the outbreak of the mutiny, he was temporarily placed in command of all the British forces in India. It was he who sent Havelock to the relief of Cawnpore and Lucknow. He was Governor of Malta from 1867 to 1872, was appointed governor of Chelsea Hospital in 1874, and in 1883 was promoted to be field marshal.

GRANT, Percy Stickney (1860–). An American Protestant Episcopal clergyman. He was born in Boston and was educated at Harvard University (A.B., 1883; A.M., 1886) and at the Episcopal Theological School in Cambridge (B.D., 1886). He was assistant minister of the church of the Ascension (1886) and minister of St. Mark's Church (1887–93), both at Fall River, Mass., and was also rector at Swansea, Mass., in 1890–93. In 1893 he became minister of the church of the Ascension of New York City. He became known for support of Socialism and for his "forum" for the expression of views on labor and living conditions. His writings include: *Ad Matrem* (1905); *The Search of Belisarius* (1907); *Observations in Asia* (1908); *Socialism and Christianity* (1910); *The Return of Odysseus* (1912).

GRANT, Robert (1814–92). A Scottish astronomer, born at Grantown-on-Spey, Morayshire. He studied for a short time at King's College, Aberdeen, became connected with a London counting house, and from 1845 to 1847 was in Paris attending the lectures of Leverrier and Arago and making researches preparatory to his *History of Physical Astronomy from the Earliest Ages to the Middle of the Nineteenth Century* (London, 1852), a work for which the gold medal of the Royal Astronomical Society was awarded in 1856. In 1859 he was appointed professor of astronomy and director of the observatory in the University of Glasgow. He accompanied the Himalaya expedition of 1860 to Spain to observe the total solar eclipse. His further publications include a valuable *Catalogue of 6415 Stars for the Epoch 1870* (1883), with a *Catalogue of 2156 Stars* (1892), in supplement; and translations of the *Notices biographiques* (as *Biographies of Distinguished Scientific Men*, 1854), and *Sur les comètes* (as *Popular Treatise on Comets*, 1861), of Arago. From 1852 to 1860 he also edited the *Monthly Notices* of the Royal Astronomical Society, of which he was elected fellow in 1850.

GRANT, Robert (1852–). An American novelist and essayist, born in Boston. He graduated at Harvard in 1873, received the doctorate of philosophy in 1876, and graduated from the Harvard Law School in 1879. In 1893 he was appointed judge of the Probate Court and of the Court of Insolvency for Suffolk County, Mass. His early literary work was trivial or juvenile, e.g., *The Confessions of a Frivolous Girl* (1880) and *The Lambs* (1882), a book of verse. His later work includes: *The Carletons* (1886); *An Average Man* (1883); *The Knave of Hearts* (1885); *A Romantic Young Lady* (1886); *Face to Face* (1886; 2d ed., 1901); *The Bachelor's Christmas, and Other Stories* (1895); *Unleavened Bread* (1900); *The Undercurrent* (1904); *The Orchid* (1905); *Law Breakers and Other Stories* (1906); *The Chippendales* (1909; 2d ed., 1913); *The Convictions of a Grandfather* (1912). Essays on social topics are gathered under the titles: *The Opinions of a Philosopher* (1893); *Reflections of a Married Man* (1892); and *The Art of Living* (1895).

GRANT, Ulysses Sherman (1867–). An American geologist, born at Moline, Ill. He graduated from the University of Minnesota in 1888 and from Johns Hopkins University (Ph.D.) in 1893; was assistant State geologist of Minnesota in 1893–99, and taught geology at the State university in 1897–98; and in 1899 became professor of geology and curator of the museum at Northwestern University. He served on several State, as well as the national, geological surveys, from 1897 to 1906 was associate editor of the *American Geologist*, and published: *Preliminary Report on the Copper-Bearing Rocks of Douglas County, Wisconsin* (1900; 2d ed., 1901); *Report on the Lead and Zinc Deposits of Wisconsin* (1906); *Copper and Other Mineral Resources of Prince William Sound, Alaska* (1906; 1910); *Glaciers of Prince William Sound and Kenai Peninsula, Alaska* (1910–13).

GRANT, (Hiram) Ulysses Simpson (1822–85). A celebrated American general and the eighteenth President of the United States. He was born at Point Pleasant, Clermont Co., Ohio, April 27, 1822, and was the eldest child of Jesse R. Grant, a tanner and farmer, and Hannah Simpson Grant. On his father's side he was remotely of Scottish ancestry, being a descendant of Matthew Grant, one of the founders of Dorchester, Mass., in 1630, and of Windsor, Conn., in 1635, and a man of importance in the latter Colony, which he served as surveyor for more than 40 years. Ulysses' great-grandfather, Noah Grant, held a military commission in the French and Indian War, and his grandfather, also named Noah, served in the continental army throughout the Revolutionary War, afterward emigrating to Westmoreland Co., Pa., and thence to Deerfield, Ohio. His maternal grandfather, John Simpson, had likewise emigrated to Ohio from Pennsylvania.

Jesse Grant, who had worked as a tanner for the father of the afterward noted Abolitionist, John Brown, started in business for himself at Ravenna, but removed to Point Pleasant, and in 1823 to Georgetown, about 40 miles from Cincinnati, where Ulysses was brought up, working on his father's farm in summer and attending school in winter. Jesse Grant, desirous that his son should have a better education than he himself had had, procured for him in 1839 an appointment to West Point, and at this time there was a change in name from Hiram Ulysses to Ulysses Simpson, Congressman Hamer in asking for the appointment having added to the name by which the boy was usually called the name of his mother's family, and all attempts of Ulysses to have the error corrected were in vain. Ulysses graduated, in 1843, twenty-first in a class of 39, and was then commissioned brevet second lieutenant in the Fourth Regiment of Infantry, stationed at Jefferson Barracks, Mo. In May, 1844, his regiment was ordered to Louisiana and in September, 1845, to Texas, to join the army of General Taylor. In the Mexican War Grant took part in the battles of Palo Alto and Resaca de la Palma and was present at the capture of Monterey, was then made quartermaster of his regiment in 1847, participated in the battles of General Scott's campaign, and for his bravery at Molino del Rey, Sept. 8, 1847, was made first lieutenant, and for his conduct at Chapultepec, September 13, was brevetted captain. In the summer of 1848 his regiment returned, to be stationed first at Detroit and then at Sackett's Harbor. In the same year he was married to Miss Julia T. Dent, of St. Louis, sister of one of his classmates at West Point, who survived him many years, dying in 1902. In 1852 he accompanied his regiment to California and Oregon, and on Aug. 5, 1853, was commissioned full captain; but on July 31, 1854, resigned and removed to the neighborhood of St. Louis, Mo., where he cultivated a farm and engaged in the real-estate business. His lack of knowledge of business methods, however, and his carelessness in money matters involved him heavily in debt and caused him in 1860 to give up and move to Galena, Ill., where he was employed in his father's store at $800 a year. Here he was living when the Civil War broke out in 1861. He immediately recruited and drilled a company of Galena volunteers and accompanied them to Springfield, where he was employed in the Adjutant General's department as a mustering officer. He offered his services to the national government, but, receiving no reply, accepted on June 17 the colonelcy of the Twenty-first Illinois Volunteer Infantry and served with his regiment under General Pope in Missouri until August 7, when he was commissioned a brigadier general of volunteers. In this capacity he served in Missouri, was later placed in charge at Cairo, Ill., and early rendered important service by the seizure, on Sept. 6, 1861, of Paducah, Ky., at the mouth of the Tennessee, and on the 25th of Smithland, at the mouth of the Cumberland, two important strategic points. His next move, a month later, was to check the advance of a large force under Gen. Jeff Thompson, this being successfully accomplished by two battles—one at Fredericktown, Mo., the other at Belmont. The District of Cairo was now enlarged, and General Grant was placed in command. In February, 1862, he moved from Paducah with 15,000 men, aided by Commodore A. H. Foote (q.v.), with a fleet of gunboats, for the purpose of capturing Fort Henry, on the Tennessee, and Fort Donelson, on the Cumberland. The former surrendered February 6, its reduction, however, being the work of the gunboats; the latter was taken on the 16th, only after a severe battle in which the land forces were engaged. (See FORT HENRY AND FORT DONELSON.) Buckner, who was in command of the fort after the withdrawal of his superior officers, proposed the appointment of commissioners to settle the terms of capitulation, to which General Grant replied: "No terms other than an unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." The capture of this fort was the first important and brilliant victory of the Federal arms, and it made a great impression upon the country. General Grant was at once made a major general of volunteers, his commission being dated as of the day of the battle; and by a play upon his initials he became widely known as "Unconditional Surrender Grant." The battle of Shiloh (q.v.), or Pittsburg Landing, was next fought. The Federal troops at that point were attacked April 6 by a large Confederate force under Gen. A. S. Johnston (q.v.) and suffered heavy loss. General Grant arrived on the field at the critical moment and reformed the broken lines, and, heavy reënforcements under General Buell having arrived, the battle was renewed on the 7th, and the Confederates, now under the command of General Beauregard (Johnston having been killed), were driven back to Corinth. In this battle General Grant was slightly wounded. He was second in command in the movement against Corinth, which was occupied by the Federal troops on May 30. When, in July, General Halleck was called to Washington to take command of the armies of the United States, General Grant was assigned to the command of the Department of the Tennessee, with headquarters at Corinth. In September he fought the Confederate General Price at Iuka and defeated him. He then removed his headquarters to Jackson, leaving Rosecrans with 20,000 men to hold Corinth, which he did successfully. In October General Grant's department was enlarged by a portion of Mississippi, including Vicksburg, the forces under his command being designated as the Thirteenth Army Corps. After several efforts by different plans to capture Vicksburg, he was finally enabled, as a result of his brilliant movements, to invest the city, May 18, 1863, and on July 4 General Pemberton surrendered with about 30,000 men. General Grant was now appointed a major general in the regular army, and in October was placed in command of the Military Division of the Tennessee, comprising the departments commanded by Sherman, Thomas, Burnside, and Hooker. General Grant was next called upon to conduct the operations against the Confederate General Bragg at Chattanooga. On November 24 the Federals stormed Lookout Mountain, and on the 25th they carried the heights of Missionary Ridge. General Halleck, in his annual report to the War Department, said that, in view of the strength of Bragg's position and the difficulty of storming his intrenchments, "the battle of Chattanooga must be considered the most remarkable in history. Not only," he continued, "did the officers and men exhibit great skill and daring in their operations on the field, but the highest praise is due to the commanding general for his admirable dispositions for dislodging the enemy from a position apparently impregnable." Congress at its next session passed a vote of thanks to General Grant and his army and ordered a gold medal to be struck in his honor. The grade of lieutenant general was revived, General Grant was nominated by President Lincoln for the position, and the nomination was promptly confirmed by the Senate. On March 17, 1864, he issued his first order as commander in chief of the armies of the United States. His headquarters thereafter were with the Army of the Potomac. The battles of the next campaign, which had for their object the capture of Richmond, in front of which the main army of the Confederates was concentrated for a last and desperate resistance, were among the bloodiest of the whole war.

The first movements of General Grant, though unsuccessful as to his main design, resulted in crippling the enemy and so preparing the way for final victory; but they were attended with terrible loss of life. The great battle of the Wilderness (q.v.) was fought against General Lee on May 5–May 6 and was followed by the bloody engagements at Spottsylvania Court House. On June 3 Lee repulsed a tremendous assault of the Union forces at Cold Harbor. General Grant, having failed in his flanking movements, saw at last that his only hope of seizing Richmond depended upon his first taking Petersburg, and to this object he now addressed himself with his usual pertinacity. Lee attempted to create a diversion by sending Early on a raid across the Potomac. Sherman soon after forced Hood to evacuate Atlanta and then started on his famous "march to the sea." Sheridan's victory at Five Forks, March 31–April 1, 1865, destroyed the last hope of a successful defense of Richmond. On April 2 Petersburg was abandoned, and on the 3d the Federal forces entered the Southern capital, the Confederates fleeing as they advanced. Grant pursued the fleeing army, overtook and surrounded it, and forced it to surrender at Appomattox Court House on April 9. Lee was captured, and the Confederacy overthrown.

The assassination of Lincoln and the accession of Andrew Johnson quickly followed, and then came the excitement of the period of Reconstruction, in which General Grant, for whom Congress had created the rank of general of the army, bore a loyal and honorable part. During the administration of Johnson he was drawn into the struggle between the President and Congress. On the removal of Stanton, Secretary of War, by President Johnson, Grant was asked to fill the office ad interim, and held it from August, 1867, to January, 1868. Having become prominent in national politics, he was soon recognized as an available candidate for the presidency, his military services making it evident that whatever party nominated him would receive a large independent support. He was approached by members of both parties, but his views were more nearly in accord with those of the Republicans. In May, 1868, a convention of soldiers and sailors at Chicago indorsed his contemplated candidacy, and on May 20 the Republican Convention on the first ballot nominated him for the presidency unanimously, naming for the vice presidency Schuyler Colfax, of Indiana. Although the Democratic candidate, Gov. Horatio Seymour, carried his own State of New York, he secured only seven other States, with a total of only 80 electoral votes against 214 electoral votes cast for Grant. The new administration was marked by a studied independence of congressional politicians and by a disregard of various political traditions of the national government. The apparent influence of a military coterie, coupled with the President's marked reticence as to his views and plans, and his want of tact in dealing with civilians, produced an unfortunate lack of cordiality in his relations with Congress and gave rise to a few incidents of discord. During the campaign he had been conspicuously reticent and inactive, and it was impossible to learn in advance his intentions with regard to matters of public moment. However, he had the confidence of the people at large, and this was increased by the negotiation of the important Treaty of Washington (q.v.) and by the steps which were thus taken for the early settlement of the Alabama Claims (q.v.). The President made foreign relations an important feature of his first administration by his persistent efforts in favor of the annexation of Santo Domingo, the treaty for which, however, was rejected by the Senate, largely through the opposition of Charles Sumner, whose attitude in this matter led to his exclusion, by the friends of the administration, from his influential post as chairman of the Senate Committee on Foreign Relations. A policy of friendly supervision of the South American states was also followed, and much interest was manifested in the war of independence which was being waged in Cuba, and the danger of intervention seemed imminent, especially for a brief period during the excitement caused by the seizure of the *Virginius*. The political condition of the South continued to present serious problems, although most of the actual work of reorganization had been accomplished; the vindictiveness of the extreme Republicans was abating; and the President was inclined to lessen the direct control of Southern administration at the hands of the national government and to look forward to the moral regeneration of the newly organized political bodies through their own initiative unaffected by external influences. (See RECONSTRUCTION.) The scandals attaching to the Crédit Mobilier (q.v.) were looked upon by the President's opponents as sources of weakness; but neither these nor other seeming irregularities had any material effect in the campaign of 1872, when Grant was reelected with the unprecedented number of 286 electoral votes, and with a popular vote exceeding by more than 700,000 that given to his chief opponent, Horace Greeley (q.v.). The collapse, as it seemed, of the movement of the new Liberal-Republican party (q.v.) left the President in full authority, with very little opposition and with very few problems of really national importance to be settled. Financial affairs, the control of the Indians, and minor matters of ordinary significance occupied the greater portion of his second term, which was marked also by various irregularities, such as

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the scandal of the "Whisky Ring" (q.v.), in which high Federal officials were concerned, but in which the President himself was in no way implicated, save in so far as he obstinately stood by friends whose guilt was beyond doubt. In 1874 he rendered one of his greatest civil services to his country by his veto of the bill passed by Congress for the inflation of the paper currency, and he encouraged the passage of the Resumption Act in the following year.

At the close of his second term, in 1877, he made the tour of the whole civilized world, visiting especially the great countries of Europe and Asia, and receiving, as a soldier and civilian and the first citizen of the United States, all the honor which rulers and people could bestow. As the unofficial representative of his country, his bearing was such as to win universal admiration and respect. On his return home in the spring of 1880 a large and influential portion of the Republican party sought to make him a candidate for the presidency once more; but the movement was defeated, by a narrow margin, on account of the formidable opposition to the bestowal of the office upon any man, however eminent or able, for more than two terms.

After his long journey General Grant made his home in New York. He became a partner in a financial firm which came to grief and involved him in pecuniary ruin, but the only blame that attached to him was that he bestowed too much confidence upon those who misused it. Every token of respect was shown to him in the city of his residence, and Congress, by a special enactment in 1884, placed him on the retired list of the army, as General, with full pay—a position he had resigned to become President.

In the summer of 1884 General Grant entered upon a long period of suffering from a cancerous affection of the throat, and he died at Mount MacGregor, near Saratoga, N. Y., July 23, 1885. Until a few days before his death he was diligently engaged in writing his memoirs, in order by their sale to make provision for his family. His body found its final resting place in a magnificent tomb in Riverside Park, New York City, overlooking the Hudson River. See Plate of NEW YORK.

Memoirs of General Grant's career are numerous. Soon after the Civil War Gen. Adam Badeau, his aid near the close of the war, wrote his *Military History* in three octavo volumes (New York, 1867–81). Grant's *Personal Memoirs* (New York, 1885) were a great literary success.

Bibliography. There is a short and excellent biography by Col. W. C. Church (New York, 1897); another by Gen. James Grant Wilson (ib., 1897); a study of the ancestry of General Grant by E. C. Marshall (ib., 1869), and a story of his tour around the world by John Russell Young (ib., 1879). Other works are Garland's *Grant: His Life and Character* (New York, 1898); Helen Nicolay's *The Boys' Life of Ulysses S. Grant* (ib., 1909); *Letters of Ulysses S. Grant to his Father and Youngest Sister, 1857–78* (ib., 1912), ed. by his nephew, Jesse Grant Cramer; Hosmer, *The Appeal to Arms* (ib., 1907) and *Outcome of the Civil War* (ib., 1907); Rhodes, *History of the United States* (ib., 1896–1906); *The Reminiscences of Carl Schurz* (ib., 1907–08). Among the eulogies of General Grant, that by Henry Ward Beecher, in Boston, Oct. 22, 1885, deserves special mention. See UNITED STATES.

GRANT, SIR WILLIAM (1752–1832). A British jurist and politician, born at Elchies on the Spey. He was educated at King's College, Aberdeen, and at Leyden University, and was called to the bar in 1774. He was appointed Attorney-General of Canada in 1776, but a few years later returned to England, where he at first met with small success. In accordance with Pitt's advice he entered Parliament in 1790 and soon attained great prominence in that body. He held a number of political offices, notably that of Solicitor-General in Pitt's administration, which procured him the honor of knighthood. In 1801 he was appointed Master of the Rolls, an office which he held for more than 16 years, and in the discharge of which he made an enviable reputation as a judge. Consult Townsend, *Lives of Twelve Eminent Judges* (2 vols., London, 1846), and Brougham, *Statesmen of the Time of George III* (ib., 1859).

GRAN'TA. An English river. See CAM.

GRANTHAM, grănt'am. An ancient market town in Lincolnshire, England, on the Witham, 23 miles south-southwest of Lincoln (Map: England, F 4). It is an important railroad junction on the Great Northern Railway, whence branch lines proceed to Lincoln, Boston, and Nottingham. It is connected with the river Trent by a canal 30 miles long. It has neighboring iron mines and considerable trade in malting and manufactures of iron, leather, paper, brick, agricultural implements, and coaches. The restored church of St. Wulfram, founded in the thirteenth century and surmounted by an elegant spire, 279 feet high, ranks as one of the finest parish churches in England. The town also gives its name to a suffragan bishop of the Lincoln diocese. Its other notable buildings are the thirteenth-century Angel Inn, where King John held court and Richard III signed Buckingham's death warrant; the free grammar school, founded in 1528, where Sir Isaac Newton was educated; the guildhall with its spacious assembly room; the town hall, the two exchanges, the literary institute, and the library. A bronze statue of Sir Isaac Newton graces St. Peter's Hill. The town owns the markets. Grantham was incorporated in 1463 by Edward IV and is represented by one member in Parliament. Here, on May 13, 1643, Oliver Cromwell fought his first successful battle. Pop., 1901, 17,600; 1911, 20,074. Consult Turnor, *History of the Town and Soke of Grantham* (London, 1806).

GRANT'LEY, BARON OF. See FURNESS, CHRISTOPHER FURNESS.

GRANT'S GAZELLE. See GAZELLE.

GRANTS PASS. A city and the county seat of Josephine Co., Oreg., on the Rogue River, 297 miles south of Portland, on the Southern Pacific Railroad (Map: Oregon, B 5). It has extensive manufactures of lumber in various products and carries on a large trade as the centre of an agricultural, lumbering, and mining district. There are also railroad machine shops, brickyards, and other industrial plants, and the city contains a public library. Crater Lakes and the Oregon Caves, near here, are of great scenic interest. Pop., 1900, 2290; 1910, 3897.

GRAN'ULAR LIDS. See CONJUNCTIVITIS.

GRAN'ULA'TION. A process of healing in wounds whose bleeding surfaces cannot be brought together. In wounds that can be closed, healing often takes place by "first intention." (See Wound.) In an open wound about the seventh day there appears in its depths a mass of bright reddish material arising from all sides, composed of small papillæ. The surface of this new growth is pebbled or granular, and it consists of a number of cells, together with new connective tissue provided with many looping arteries. The surface is bathed in pus. These papillæ are called granulations. In most cases, where the successive layers of granulations reach the level of the surface of the wounded part, the integument shoots forth from the margins, finally meeting in the centre, and the wound skins over. In other cases the granulations grow above the surface in heaps and are then termed exuberant granulations, or "proud flesh." Sometimes after granulation has commenced in a wound its surfaces may be brought together and adhere, presenting an instance of union by "second intention." Granulation tissue is a protection against the invasion of bacteria. The wall-like aggregation of leucocytes, new connective-tissue corpuscles, and new blood vessels presents no open lymph spaces through which alone the microörganisms gain entrance.

GRAN′ULITE. A type of metamorphic rock, characterized by a schistose arrangement of the minerals which consist largely of quartz and feldspar. The grain is fine, and except for its schistosity the rock resembles an igneous felsite or aplite. Granulites are quite common among the older gneiss areas, such as those of the Adirondacks and the New England States, and have been described in Germany, Austria, and the Scandinavian countries.

GRANVELLE, grän′vĕl′ (Sp. **GRANVELLA,** grän-vĕl′yȧ), Antoine Perrenot, Lord of (1517–86). A Spanish cardinal and statesman. He was the son of Nicholas Perrenot, Lord of Granvelle, Secretary of State under Charles V and one of that Emperor's most influential ministers, and was born at Besançon, Aug. 20, 1517. He pursued the study of law and theology at the universities of Padua, Paris, and Louvain, and at the age of 23 was made Bishop of Arras. Through his father's influence he speedily came to play an important part in the political affairs of the Empire. His defense of Charles's policy delivered at the opening of the Council of Trent (1545) gained him the permanent good will of the Emperor, who employed him in his negotiations with the Protestant princes of Germany in 1547, and who in 1550 made him Secretary of State on the death of the elder Granvelle. As one of the shrewdest diplomats probably of his time, he participated in the negotiations leading to the Peace of Passau (1552) and was instrumental in bringing about the marriage of Philip II with Mary of England. In 1559 he was made Chief Minister to Margaret of Parma, Regent of the Netherlands, and became in turn Archbishop of Malines (1560) and Cardinal (1561). As a stranger and a churchman who represented the rigorous absolutism of the Spanish court, Granvelle succeeded in arousing the bitter hatred of the Flemings. Margaret of Parma, William of Orange, the Counts Hoorn and Egmont, united in demanding the removal of the unpopular Minister, and finally, in 1564, Granvelle was recalled at his own request. He took up his residence at Besançon and occupied his leisure in literary and scientific studies. He subsequently acted as Spanish representative at the papal court and brought about the formation of the Holy League against the Turks by Venice, the Pope, and Philip II, whose united fleets crushed the Ottoman sea power at Lepanto (1571). After holding the post of Viceroy of Naples for some time he was made in 1575 head of the Spanish Council of State and in this capacity forwarded the incorporation of Portugal with Spain. In 1584 he became Archbishop of Besançon. He died at Madrid, Sept. 21, 1586. More than 80 manuscript volumes of his papers have been preserved, only part of which have ever been published. Consult: Weiss, *Papiers d'état du Cardinal Granvelle* (9 vols., Pons, 1841–52); Motley, *Rise of the Dutch Republic* (3 vols., New York, 1883); Poullet and Piot, *Correspondance du Cardinal Granvelle, 1565–86* (12 vols., Brussels, 1878–96); *Cambridge Modern History*, vol. iii (New York, 1904).

GRANVILLE, gräɴ′vēl′. A fortified seaport town and watering place at the mouth of the Bosq, on the English Channel, in the Department of Manche, France, 85 miles southwest of Cherbourg and 28 miles southeast of the island of Jersey, with which it has regular steamship communication (Map: France, N., D 4). The town consists of an upper and a lower part built on a promontory, surmounted by a citadel. The church of Notre Dame is an interesting fifteenth-century Gothic edifice. The tidal harbor is well sheltered, has extensive piers and a dry dock, and a good trade in building stone, oysters, eggs, vegetables, fish, and codliver oil is carried on. It has also a small shipbuilding trade. A fishing fleet is yearly equipped to visit the Newfoundland and other grounds. Granville is a popular summer and sea-bathing resort. It is the seat of a hydrographic school. It dates from an English fort built early in the fifteenth century, which the French captured in 1450; in 1641 the French again took the fortifications, which the English had built the year previously. In 1695 and in 1808 it was bombarded by the English and in 1793 was almost totally destroyed by the Vendean troops. Pop., 1901, 11,667; 1911, 11,347.

GRAN′VILLE. A village in Washington Co., N. Y., 66 miles north-northeast of Albany, on the Delaware and Hudson Railroad (Map: New York, G 4). It is the centre of an important roofing-slate industry and has manufactories of shirts, condensed milk, gloves, and infants' clothes. The water works are owned by the village. Pop., 1900, 2700; 1910, 3920.

GRANVILLE. A village in Licking Co., Ohio, 6 miles west of Newark, on Raccoon Creek and on the Toledo and Ohio Central and the Ohio Electric railroads (Map: Ohio, E 5). It is the seat of Shepardson College for Women, of the Doane Academy, the Fannie Doane Home for Missionaries' Children (Baptist), and of Denison University (q.v.). The village owns its electric-light plant. Pop., 1910, 1394.

GRANVILLE, George. See Landsdowne, Lord.

GRANVILLE, George Leveson-Gower, second Earl (1815–91). An English statesman. The eldest son of the first Earl, he was born in Mayfair, London, May 11, 1815. He was educated at Eton and at Christ Church, Oxford. In 1836 he was attaché to his father in the Embassy to France; in the same year he entered Parliament for Morpeth, and was reëlected in 1837. From 1841 to 1846 he represented Lichfield. In the Commons he was a Liberal and free trader. At his father's death, in 1846, he became a peer, was made Vice President of the Board of Trade in 1848, and went into the cabinet in 1851, at the close of that year succeeding Palmerston in the Foreign Office. He retired with the Russell ministry. He was President of the Council (1852–54, 1855–58, 1859–66), Secretary of State for the Colonies (1868–70), and Secretary for Foreign Affairs (1870–74). During Gladstone's temporary retirement (1878–80) Lord Granville acted as leader of the Liberals. When Gladstone became Premier again, in 1880, Lord Granville once more was made Secretary of State for Foreign Affairs, going out of office with Gladstone in 1885. In 1886 he became Secretary for the Colonies. The chief events of his career were the establishment of Afghanistan as a neutral zone between India and Russia, the suppression of Arabi Pasha's Egyptian revolt, and the consequent establishment of British predominance in Egypt. Lord Granville was esteemed by men of all parties for his urbanity and unfailing tact, but he lacked virility as Foreign Secretary. From 1856 until his death (March 31, 1891) he was chancellor of London University. Consult Fitzmaurice, *Life of Granville G. Leveson-Gower* (2 vols., London, 1905), and Spencer Walpole, "Lord Granville," in *Essays Political and Biographical* (ib., 1908).

GRANVILLE, JOHN CARTERET, EARL. A British statesman (1690–1763). See CARTERET, JOHN.

GRAPE (from OF. *grape*, cluster, from OHG. *crapho*, Ger. *Krapfen*, hook). The fruit of any species of the genus *Vitis;* also, in the United States and Canada, any plant of this genus. In other English-speaking countries the plant is designated the "vine." Grapes grow wild in Egypt, Arabia, Turkey in Asia, and in the Mediterranean countries of Europe; more than 20 species are found in America, from Canada to Florida and westward. The cultivated vines of Europe and the Orient all belong to the single species *Vitis vinifera.*

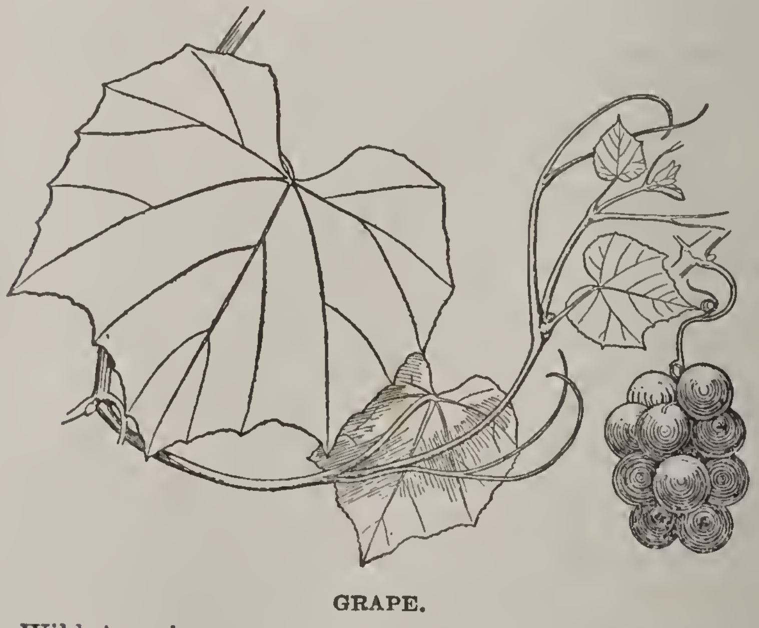
The cultivation of the grape and the making of wine are of the most remote antiquity, as appears from the Scripture history of Noah and from many passages of the most ancient authors, e.g., Vergil and Columella, who both gave instructions in vine cultivation. The mythological fable of the marches of Bacchus relates to the extension of the culture of the vine from Asia into Europe. The vine was probably introduced into the south of France and into Italy by the Phocæans about 600 B.C., and its cultivation was early coextensive with civilization in all the Mediterranean regions. In Italy so much of the land was occupied by vineyards that the Emperor Domitian, fearing a scarcity of grain, issued a restrictive or prohibitory edict (81 A.D.), which remained in force long afterward through fear that an abundance of fine wine might tempt the barbarians of the north to invade the country. The vine was introduced into England by the Romans. After the Norman Conquest the vineyards which seem to have existed in the south and southwest soon disappeared, having had only occasional successors until the nineteenth century, when vine culture in gardens and on walls mainly for fresh fruit increased in this region. The vine does not, in ordinary seasons, ripen its fruit well in Great Britain farther north than Yorkshire, although grapes have occasionally ripened in the open air in Scotland. On the Continent the cultivation of the vine for wine is an important industry as far north as Coblenz on the Rhine; but in some countries, particularly in Greece and the Ionian Islands, the product of the vineyards is converted into raisins. By the Spaniards and Portuguese the vine was introduced into the Azores, the Madeira and Canary Isles, and America. The first vines were carried to the Cape of Good Hope by the Dutch in 1650; but while the wines of Madeira and those of the limited district of Constantia at the Cape of Good Hope have long enjoyed a high celebrity, and those of Canary and Teneriffe have been exported in considerable quantities, it is only of late that much attention has begun to be paid to vine culture in the other parts of Cape Colony. Good wines are being made in Australia.

The grape is a perennial, deciduous, woody, climbing vine, which makes itself fast to its support by strong persistent tendrils, opposite or alternate with the large angular, lobed, toothed, and generally hairy leaves. The stems are numerous, very long, branching, of rapid growth, and with many swollen joints; the outer bark readily splits and peels; the woody tissue abounds with vessels of large size, from which at the seasons of active vegetation the sap pours in prodigious quantity if the branch be wounded. The fruit stalks, which are much branched modified tendrils, are borne on wood of the present season's growth, opposite the leaves. The flowers are small, greenish white, and fragrant. The fruit is a round or oval berry, two-celled and four-seeded, which varies in size from about one-fourth of an inch in diameter, as in the Corinth or "currant" grape, to nearly an inch in some of the improved American varieties. The color, which is entirely in the outer skin, may be green, red, yellow, purple, or in some cases variegated. Although the pulp of the grape is wholesome, nutritious, and gently laxative, the skin is astringent and indigestible. Some of the ovules may be abortive, or even all of them in the fruit of old vines of some varieties, as in the seedless Ascalon or Sultana raisin. The stems sometimes reach a diameter of 18 inches, and the wood, which is very hard and durable, is occasionally employed in making furniture, statues, etc. It attains also a very great age; specimens may remain fruitful for 300 or 400 years. In the Old World *Vitis vinifera* is the basis of all viticultural interests; in America several native species and hybrids between them and *Vitis vinifera* are utilized. The grapes upon which the vineyards of the eastern United States are founded are contributions of that region to the economic plants of the world. Of the species involved, *Vitis labrusca* has furnished more cultivated varieties, either pure breeds or hybrids, than all the others put together. All early attempts at viticulture were based upon the Old World grapes. As early as 1621 an unsuccessful attempt was made to introduce the European vine into Virginia, and from that time forward numerous other attempts were made. The undertaking of John J. Dufour in 1798 is especially worthy of note. But, like all other undertakings in which European vines were used, Dufour's Kentucky Vineyard Society, with $10,000 capital, was unsuccessful, although great care was exercised in the execution of every detail in the work. Later a partial success came as a result of the introduction of the so-called "cape grape," which is now known to have been an offshoot from the fox grape (*Vitis labrusca*). True success came with the introduction by John Adlum of the *Catawba*, "the first truly American grape." This variety still ranks as one of the leading wine and table grapes of the northeastern United States. The culture of the grape in the eastern United States has grown remarkably since 1860 and has reached its greatest perfection, both as regards methods of culture and marketing, in New York, New Jersey, Ohio, Maryland, and Virginia, where thousands of acres are devoted to the cultivation of table grapes, although there is a considerable output of wine and brandy in each locality. In the East the end sought is dessert fruit; in the West, wine and raisins.

The early Spanish and French missionaries planted the European vine on the Pacific slope. Here the conditions are more congenial than in the Eastern States, and the industry has flourished from the beginning. With the exception of the famous vineyards of Europe, California leads in the production of wine and raisins from *Vitis vinifera*. The largest vineyards in the world are to be found there, and the output of raisins has so increased that the importation of the fruit has greatly diminished, despite the enormous increase in the country's population. Until 1820 the Mission variety was the only European vine planted in western America, but the list has increased to more than 50 varieties, including those most prized in Europe. The repeated failures with the European grape in eastern America were due not so much to the climate, as to the ravages of the phylloxera, which found a congenial and very susceptible food plant in the introduced vines. Native vines are able to resist its attacks, but the European vines possess no such power, and when this pest was accidentally transported to France on some native American vines it spread havoc among the European vineyards. It was even thought that vine culture in Europe was doomed. Little wonder that varieties failed in the eastern United States. A remedy was hard to find, but the interest of the French government in rescuing from destruction its great vineyards and wineries stimulated research, which led to the utilization of the resistant American vines as stocks upon which to graft the European vine, even in its native clime. The success of this plan is evident from the fact that the most remunerative vineyards of Europe have roots of American species. The wine and raisin industry of the United States is being rapidly extended; and numerous successful experiments have been conducted in the southeastern United States with the European vines grafted upon resistant American stocks. Two important works on the development of American grapes are Hedrick et al., *The Grapes of New York* (Albany, 1908), and Munson, *Foundations of American Grape Culture* (New York, 1909).

Vine culture varies greatly in different countries. Success seems to depend chiefly upon sunny exposure, congenial soil, control of diseases, intelligent manuring, and cultivation. New varieties are grown from seed, but the ordinary mode of propagation is by cuttings. The cuttings are made during the dormant period, preferably in the autumn, from ripe wood of the past season's growth, and usually carrying two or three buds. These are heeled in or buried until the following spring, when they are set in nursery rows; one year later the young plants are ready for planting in the vineyard. A soil of medium fertility and gravelly texture is preferred; but certain varieties will thrive upon light soils, others upon heavy, if not too wet. Vines will endure more moisture than most other fruit-bearing plants, yet they must have drained land to give the best results. The grape is usually set in the vineyard at one year from the cutting, 8 × 8 feet or 8 × 10 feet being the popular distances for American vines. During the first year the land is given clean culture, with or without hoed crop; the second year the trellises or supports are partially constructed, and the new growth tied up out of the way of cultivation. The third year the trellises are completed, some bearing wood left, and each vine may be allowed to bear a few clusters of fruit. After the first year no other crop should be allowed to encumber the vineyard. Clean culture should be given until midsummer, after which time means should be taken to check growth and ripen the wood. Pruning the vine is based entirely upon the fact that the fruit is borne upon wood of the present season's growth, which arises from the buds of the last season's growth. All wood for fruiting purposes must therefore be one year old. All systems of pruning are either renewal or spur systems. Renewal systems seek to maintain the fruit production near the root or main trunk; spur systems renew on shoot spurs arising at intervals along a permanent arm. For description of various systems, consult Bailey, *Cyclopedia of American Horticulture* (4 vols., New York, 1900–02).

Besides the manufacture of wines, brandies, raisins, and the use of grapes for dessert purposes, unfermented grape juice is a valuable and popular product. This is made by expressing the juice, sweetening, heating to the boiling point, or Pasteurizing, and sealing while still hot in cans or strong bottles. See also WINE; BRANDY; RAISINS; CURRANT; VITACEÆ.



GRAPE.
Wild American, source of the Catawba, Isabella, etc.

Grape Diseases. Few plants are subject to as many and as serious diseases as the grape, and few plant diseases have been more fully investigated. Diseases of the grape are caused by improper conditions of soil and moisture, but more frequently by fungi and bacteria, which are often carried from diseased to healthy plants by insects. The diseases due to fungi can be successfully controlled in most cases by the thorough use of fungicides (q.v.). A few of the more destructive and widely spread diseases may be briefly considered here. *Downy mildew* (*Plasmopara viticola*) produces yellowish spots upon the upper surface of the leaves and a downy-frosty appearance beneath. Later these spots appear as light-brown discolorations. The same fungus occurs upon the fruit, when it is known as "brown rot" or "gray rot," according to the nature of the attack. The brown rot of the fruit is first manifested by purplish discolorations, soon after the appearance of which the pulp becomes soft and forms depressions, over which the skin is tightly drawn. The gray rot which attacks the young berries and their pedicels resembles the downy growth mentioned as occurring on the leaves. Downy mildew and black rot, next to be discussed, are the two most serious general grape diseases. Black rot (*Guignardia bidwellii*) attacks the leaves, producing at first reddish-brown circular spots; later a number of spots may coalesce and form irregular blotches. Upon the fruit the first sign of attack is the appearance of small brownish discolorations, which soon enlarge, the whole berry gradually becomes brown or black, withers, and finally dries up, usually remaining attached to the stem. *Grape* (q.v.) *anthracnose* (*Sphaceloma ampelinum*) attacks leaves, stems, and berries. Upon the leaves it appears as dark spots surrounded by well-marked darker bands of color. The centres later turn gray, and frequently the diseased areas fall out, giving the leaves a ragged appearance. Upon the shoots the disease manifests itself in much the same manner. On the fruit the disease is often termed "bird's-eye rot," from the peculiar appearance of the spots. The centres become gray, with an outer band quite dark and sometimes a zone of vermilion color between them. When the young fruits are attacked, they turn brown, and pink pustules appear over the surface. The tissues of the berry with this rot become hard and leathery. Other diseases resembling the above are often called anthracnose. *Bitter rot*, or ripe rot (*Glomerella rufomaculana*), attacks the stems and fruits, especially the latter, which becomes bitter, whence the name. In this disease the berries turn brown, become thickly dotted with purplish-black pimples, and ultimately fall at the least disturbance. The best preventive measure for these diseases is thorough spraying with Bordeaux mixture. *Powdery mildew* (*Uncinula necator*) is troublesome in grape houses and in the vineyards of France, but less in the vineyards of the United States. It covers the leaves, young shoots, and fruits with a powdery, meal-like growth. Upon the leaves and fruits it forms patches of various size and shape on the upper surfaces. Soon the berries shrivel, the skin cracks, and other agents of decay complete the destruction. For the prevention of the disease sulphur is perhaps the best remedy. It may be dusted over the vines in the open, or it may be evaporated without ignition in the grape house. A disease variously known as shelling, rattling, etc., is sometimes common, in which the berries fall from the clusters as ripening approaches. This is due to a lack of nutrition and may be remedied by the use of fertilizers, especially those containing potash. Crown gall, due to *Bacterium tumefaciens*, often destroys vines, the bacteria causing large hard swellings just below the surface of the ground. Two serious root rots are rather common, due to the fungi *Dematophora necatrix* and *Armillaria mellea*. For the control of crown gall and root rot the vines should be dug out and burned. Stains on grapes, resulting from the use of copper fungicides, may be removed by dipping the bunches in a dilute solution of vinegar and water. See FUNGI, ECONOMIC; DISEASES OF PLANTS; FUNGICIDE. Consult: Tubeuf, *Diseases of Plants Induced by Cryptogamic Parasites*, trans. by W. G. Smith (New York, 1897); Pierce, "Grape Diseases on the Pacific Coast," in *United States Department of Agriculture, Farmers' Bulletin 30* (Washington, 1901); Duggar, *Fungous Diseases of Plants* (New York, 1909); Stevens and Hall, *Diseases of Economic Plants* (ib., 1910); Stevens, *The Fungi which Cause Plant Diseases* (ib., 1913); and the authorities referred to under FUNGICIDE.

GRAPE ANTHRAC'NOSE. A disease of the grape, sometimes called bird's-eye disease, because of the appearance of bird's-eye spots upon the berries, stems, and leaves. The spots upon the berries are first brown, and as these enlarge the centre becomes sunken, and between the lighter centre and the brown border a reddish band appears. It is a disease very difficult to control when it becomes epidemic. See GRAPE.

GRAPE CURE. A method of treatment of some diseases and conditions with a diet of which grapes form a very large part. This treatment is in vogue to some extent in France, but to a much greater extent in Germany and in Hungary, in which countries, as well as in Austria and Switzerland, there are sanitariums at which the grape cure is administered. According to Carrière, the cure formerly consisted of an exclusive diet of grapes, taken to repletion. It was usual to commence with a pound and rapidly increase the amount to eight pounds a day. The first meal, consisting of a large amount of grapes, was eaten early in the bedroom. The second meal was taken in the vineyard, at breakfast time. The third meal, at noon, after the morning walk, consisted of bread and water. The fourth meal was taken early in the evening and consisted of grapes only. It was soon found, however, that an exclusive diet of grapes causes emaciation; while if meats and other food be added the patient gains. The modified grape cure now in vogue therefore includes a large quantity of grapes before breakfast, with bread, if preferred; a breakfast, an hour later, of bread, tea, or coffee, or cocoa, and a broth; grapes again an hour before the midday meal, and again an hour before the evening meal.

Grapes differ much in composition; but Smith gives the following percentage for ripe, medium-sized grapes:

SOLUBLE	
Grape sugar	13.8
Tartaric acid	1.12
Nitrogenous matter	.8
Gum, fat, etc.	.5
Salts	.36
Water	79.8

INSOLUBLE	
Skins, stones, etc.	2.6
Pectose	.9
Mineral matter	.12

The experiments of Bichof and Voigt showed that a diet of 400 grams of meat and 300 grams of grape sugar caused a gain of 92 grams in weight in one who had lost 23 grams under a diet of 500 grams of meat and 200 grams of grape sugar and had lost 230 grams under a diet of 500 grams of meat and 100 grams of grape sugar. Therefore about 4 pounds of grapes daily, with nourishing meats and some bread, form the proper diet at a grape-cure establishment. The grape cure has been of advantage in diarrhœa, dysentery (non-amœbic), hæmorrhoids, engorgement of the spleen, and plethora of the portal system, and has caused improvement in cases of tuberculosis, gout, and some skin diseases. Undoubtedly regular habits of life, sufficient sleep, out-of-door life, climate, and water play a significant part in all improvement secured from a grape cure. See DIET.

GRAPE EATER. See WHITE-EYE.

GRAPEFRUIT (so called because borne in clusters like a bunch of grapes). A common term in the United States and the West Indies for the round-fruited forms of *Citrus decumana* or *grandis.* The pear-shaped forms of this genus are discussed under SHADDOCK (q.v.). The grapefruit, or pomelo as it is sometimes called, ranges in size from that of a large orange to about six inches in diameter. It has a slightly bitter acid pulp and is valued primarily by Americans as a breakfast fruit. It is also used for salads and desserts. It appears to have been brought to Florida by the Spaniards in the sixteenth century, and many desirable varieties have been originated there.

The commercial production of grapefruit is comparatively recent, but the industry has developed rapidly. Florida now (1916) produces over 2,000,000 boxes annually as compared with 12,000 boxes in 1899. The industry is being extended in the West Indies, and also slowly in California and Arizona, where more difficulty has been experienced in securing varieties adapted to the region. At present California ships about 150,000 boxes out of the State. A hybrid form, the tangelo, recently developed from a cross between the tangerine orange and the grapefruit, is being planted to some extent. The grapefruit is more susceptible to cold than the orange and reaches its best development where frosts are not frequent or severe.

The tree is relatively free from most citrous diseases, but more susceptible than oranges or lemons to citrus canker, a very infectious disease somewhat similar in appearance to the citrus scab, which was discovered near Miami, Fla., in 1913 and has spread over a large area in southern Florida. No remedy has been found for this disease, and infected trees are being burned to check its spread.

For other diseases of grapefruit see ORANGE DISEASES, and for cultural requirements see ORANGE. For illustration see Colored Plate of CITRUS FRUITS.

GRAPE HY'ACINTH (so named from the flower clusters in some species resembling small clusters of grapes), *Muscari.* A genus of 40 or 50 species of bulbous-rooted, spring-blooming plants, of the lily family, nearly allied to the hyacinth, but differing in the globose or subcylindrical perianth, contracted at the mouth. The species are natives chiefly of the Mediterranean region and the warmer temperate parts of Asia. Some of them are frequent in our flower borders. The musk hyacinth (*Muscari moschatum*) has a smell of musk. *Muscari racemosum* is a somewhat doubtful native of the south of England, sparingly escaped in the United States. The common grape hyacinth (*Muscari botryoides*), a native of the Mediterranean region, has escaped from cultivation in various parts of the United States. It has pale-blue flowers and is extensively cultivated. Numerous varieties of this and other species are known to the horticultural trade.

GRAPE MIL'DEW. There are two diseases of grapes called mildews. The powdery mildew is a superficial parasite, the light-colored mycelium covering the leaves and sometimes the flower clusters. The downy mildew is a much more injurious disease, because it spots not only the leaves, but also the green grapes. It is a disease of American origin, and its most susceptible host is the wine grape, *Vitis vinifera.* For this reason the wine grape cannot be cultivated in the eastern United States, but the absence of the powdery mildew from Europe and California has made possible the development of wine vineyards in those regions. However, the disease has reached both Europe and California, fortunately after methods of control had been developed. See GRAPE.

GRAPESHOT. A number of small projectiles held together in a canvas bag or by an iron pin and a series of iron plates containing holes in which the shot rested. The shot scattered when discharged from the gun. Formerly a very effective form of projectile, but now superseded by shrapnel. See ARTILLERY; CANISTER; ORDNANCE; PROJECTILES; SHRAPNEL.

GRAPH'IC GOLD. See SYLVANITE.

GRAPHIC METHOD. The method of representing relations between magnitudes by a diagram. In arithmetic comparisons of statistics may often be represented graphically; e.g., the curve in the above figure represents the sums paid by the United States government for pensions in various years as follows (in millions of dollars): 1862, 0.8; 1863, 1; 1864, 5; 1865, 8; 1870, 29; 1880, 57; 1890, 106; 1891, 117; 1892, 139; 1893, 157; 1894, 140; 1895, 140; 1896, 138; 1897, 140; 1898, 145; 1899, 138; 1900, 138; 1901, 139; 1902, 138; 1903, 138; 1904, 141; 1905, 141; 1906, 139; 1907, 138; 1908, 153; 1909, 162; 1910, 160; 1911, 158; 1912, 154; 1913, 175.

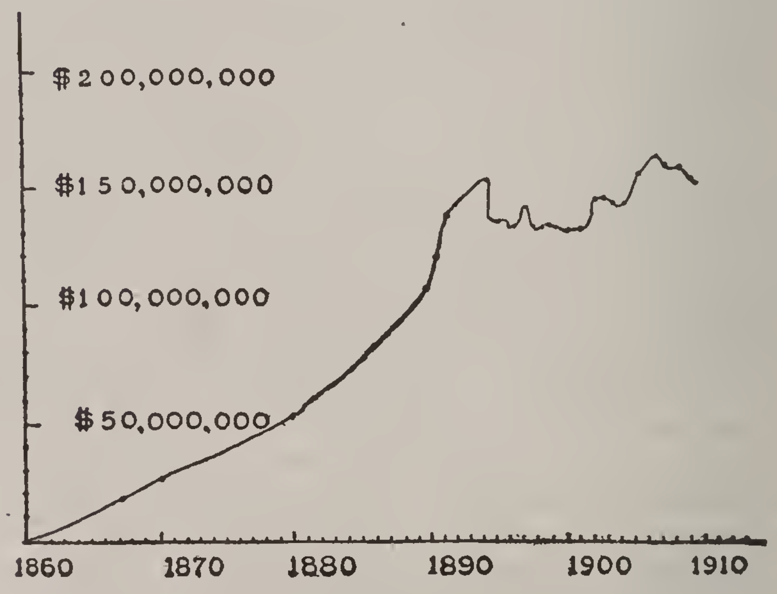


FIG. 1.

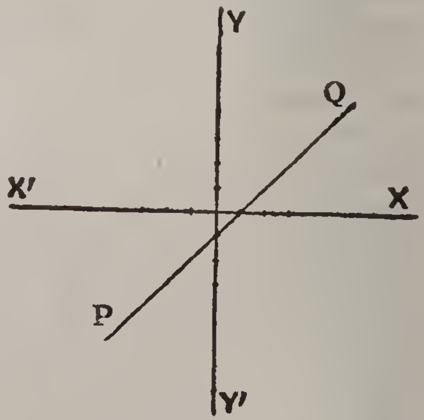


FIG. 2.

In algebra the graphic method of representing equations may be illustrated thus: To represent the equation $y = x - 1$, x may have the values: -1, 0, 1, 2 . . . . In which cases y will have the values -2, -1, 0, 1 . . . . Plotting the corresponding values of x and y as rectangular coördinates (see COÖRDINATES), the line PQ is called the graph of the equation $y = x - 1$. Similarly the graph of the equation $2x^2 - 3y^2 = 10$ is as shown in Fig. 3, the corresponding values of x and y being

$$x = \pm\sqrt{5}, \pm\tfrac{1}{2}\sqrt{26}, \pm\sqrt{11}, \pm\tfrac{1}{2}\sqrt{74}, \pm\sqrt{29}, \ldots.$$
$$y = \quad 0, \quad \pm 1, \quad \pm 2, \quad \pm 3, \quad \pm 4, \ldots.$$

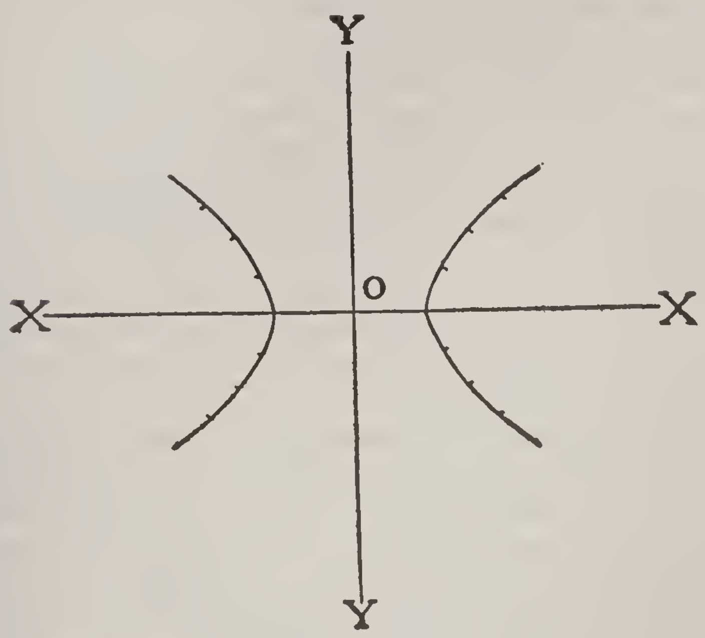


FIG. 3.

GRAPHIC STATICS. Calculations on the mutual relations of forces acting upon a body, or on the relation between such (external) forces and the stresses within the body, may be solved either by arithmetic or by the methods of *graphic statics*, i.e., by drawing diagrams in which lines of measured length and definite direction represent the forces. This science is practiced extensively in the design of bridges, dams, retaining walls, and other engineering structures. Problems in graphic statics usually involve only forces in a common plane; spatial problems can be handled graphically by projecting points and forces on two coördinate planes. The two chief expedients of graphic statics are noted below.

Force Polygon. A force is represented by a line whose length represents the amount of the force to some scale (e.g., 1 inch = 1000 pounds), drawn through the point of application of the force (or through its representation on a correct scale drawing) and in the direction of the force. Two force lines which intersect have a *resultant* represented by the third side of a triangle whose other two sides are the original forces. Thus, the water pressure against the vertical face of a dam being represented by a horizontal line through the centre of pressure, and the weight of the dam by a vertical through its centre of gravity, the pressure of the dam on its foundation is found by determining the resultant: its line of action passes through the intersection of the horizontal and vertical force lines, and its amount is found by the triangle rule stated. More than two forces acting on a single point may be combined as a polygon in place of the triangle, the missing *closing side* of the polygon being the resultant. If the force polygon closes, the resultant is zero; hence the forces are in equilibrium.

Funicular Polygon. In finding the resultant of several forces not acting on the same point it is usually, and in the case of parallel forces always, necessary to get the location of the resultant force by a special method, based on introducing two fictitious equal forces of opposite direction having a common line of action. The force polygon is first drawn, as for forces acting on a single point; its closing side gives the amount and direction of the resultant. Then a point *pole* is chosen some distance away from the force polygon, and from it *rays* are drawn to the corners of the force polygon. Between the lines of action of the forces, lines (*strings*) are drawn parallel to the successive rays, forming a *funicular polygon* whose terminal strings, parallel to the two rays drawn to the closing side of the force polygon, intersect at a point which is in the true line of action of the resultant force.

Rotative moments, or *force couples*, may be combined like forces by the force polygon, if each moment is represented by a line parallel to its axis of rotation and of length corresponding to the amount of the moment.

Beam diagrams used in solving girder problems consist generally of areas so laid off above the drawing of the beam that the vertical height of the area from the beam is a scale representation of the amount of a particular stress function (e.g., bending moment, shear, or deflection) at that point of the beam. From the bending-moment diagram the deflection curve can be obtained by Mohr's method.

Influence lines, now much used in analyzing bridge trusses, are lines drawn above the span of the beam or truss to represent the variation of one particular effect at a given point of the structure (e.g., the stress in the end post of the truss) as a one-pound load moves across the span.

GRAPHITE, grăf'īt (from Gk. γραφή, *graphē*, writing, from γράφειν, *graphein*, to write), BLACK LEAD, or PLUMBAGO. A dark steel-gray to black mineral, having a black streak, hardness of 1, and specific gravity of 2.1 to 2.3. It crystallizes in the hexagonal system and may occur in foliated form, massive, or even in hexagonal crystals, but its greasy feel, softness, and black streak enable it to be easily distinguished. While black lead is the popular name, it is misleading, for graphite is nearly pure carbon, with only 1 or 2 per cent of impurities, as can be seen from the following analyses:

ANALYSES OF GRAPHITE

	Carbon	Ash	Volatile
Ceylon.	98.817%	.28%	.90 %
Brougham, Can.	97.626	1.78	.594

Although widely distributed, graphite rarely occurs alone in large deposits, but is usually mixed with other minerals, so that it requires special treatment after mining to separate it from the accompanying rock. Graphite shows a varied mode of occurrence, being found as irregular nests or pockets (E. Siberia); in bedded deposits (Styria and Mexico); veins (Ceylon, some Canadian, etc.); disseminations (some New York deposits). The gangue minerals are variable. Mica and chlorite are hard to separate, and pyrite is also bad. It is usually found in crystalline metamorphic rocks, such as limestones, gneisses, or schists, and especially those of pre-Cambrian age; still deposits are known to occur in the Carboniferous. It has also been found in small quantities in meteorites. Two forms of graphite are recognized, viz., the crystalline or true graphite, and the amorphous or pulverulent form. Graphite may be of organic or inorganic origin. When in igneous rocks, intercrystallized with other minerals, it is, no doubt, of igneous origin, and its occurrence in meteorites bears out the possibility of this view. Where the igneous rock is associated with carbonaceous sediments, the magma may have absorbed the carbon from these. The veinlike deposits of crystalline graphite have undoubtedly been formed in fractures, probably at considerable depth, but not necessarily at very high temperatures. Various theories have been advanced to explain these, and in the case of the Ceylon veins Weinschenk believes that the graphite is of volcanic origin, and due to the reaction between carbon dioxide and cyanogen compounds. In some limestones which have been subjected to contact metamorphism the carbonaceous matter has been changed to graphite.

Many commercially important amorphous graphite deposits were coal beds that have been converted into graphite by intrusions of igneous rock, as in Sonora, Mexico, and Turret, Colo. The disseminated deposits in quartzite, limestone, and schist may be carbonaceous sediments altered by dynamic metamorphism.

The chief commercial sources of graphite are Ceylon and Austria-Hungary, smaller amounts being produced in Bavaria, Italy, Siberia, Mexico, Japan, Canada, and the United States. The Ceylon deposits, which are worked entirely by natives, are of great extent, and masses of solid graphite weighing several hundred pounds are sometimes found. The Canadian graphite occurs in Laurentian rocks, notably in the vicinity of Brougham, and has been obtained in lumps of large size. In the United States crystalline graphite is mined near Hague, N. Y., and to a considerable extent in Chester Co., Pa. At the former locality it occurs in a bed of quartzite inclosed between gneiss. Other localities in the United States are Alabama, Wyoming, North Carolina, and Rhode Island. That obtained from the last locality and Sonora, Mexico, is amorphous graphite.

Graphite is used in the manufacture of lead pencils, lubricants, stove blacking, paint, refractory crucibles, and foundry facings. For lubricants either amorphous or crystalline graphite may be used and should be free from grit. For the manufacture of crucibles, the Ceylon flake graphite is the most valuable, for amorphous graphite is not a success. The graphite for this purpose has to be mixed with clay and sand. Recently the substitution of a mixture of graphite and grease for red lead has met with much success. Pencils cannot be made from crystalline graphite alone, and are manufactured chiefly from amorphous graphite, the bulk of the American demand being supplied by the Sonora, Mexico, deposits. Most of the graphite used in paint is of the amorphous variety. Since graphite, as it occurs in nature, is always mixed with other minerals, the material after being mined is crushed and then put through some kind of cleaning or concentration process. The separation is done either by means of water or an air current, preferably the latter.

In 1898 the manufacture of artificial graphite from coke was begun at Niagara Falls, and in the year of its discovery 200,000 pounds of carbon rods were graphitized in the electric furnaces, while in 1912 the production had risen to 12,896,347 pounds. It is said that the artificial product is fully equal to the natural material in its electrical conductivity, for use as a lubricant and in the manufacture of stove polish or lead pencils.

Although the production of graphite in the United States has been increasing almost every year, still the amount produced is far from sufficient to supply the domestic demand. The imports therefore continue to be large. In 1913 the imports were 28,879 short tons, valued at $2,109,791. The production of the United States for 1913 was 4775 short tons of natural graphite ($293,756) and 6817 short tons of manufactured graphite ($973,397).

Bibliography. Newberry, "The Origin of Graphite," in *School of Mines Quarterly*, vol. viii (New York, 1887); Downs, "Occurrence, Treatment, and Application of Graphite," series of articles in the *Iron Age* (ib., 1900); Weinschenk, *Zur Kenntniss der Graphitlagerstätten* (Munich, 1897). For statistics of production and notes in regard to the trade, consult: Bastin, *Economic Geology*, vol. v (Lancaster, Pa., 1909); Ries, *Economic Geology* (3d ed., New York, 1910); Stutzer, *Die wichtigsten Lagerstätten der Nicht-Erze* (Berlin, 1911); Cirkel, *Graphite Properties, Uses, etc.*, Department of Mines, Canada (Ottawa, 1907); *Mineral Resources*, United States Geological Survey (Washington, Annual).

GRAPH'OPHONE (from Gk. γραφή, *graphē*, writing + φωνή, *phōnē*, voice). A machine for recording and reproducing sound, invented by Charles S. Tainter and Chichester A. Bell. Its principle was essentially that of the phonograph (q.v.), but it differed from Edison's original instrument in substituting a wax cylinder into which the record of the sound waves was cut for the tin foil, which was merely indented by the stylus. It was the first phonograph to use a wax cylinder. With the expiration of the Tainter-Bell patents (see GRAMOPHONE) the graphophone contributed to the disk machine the use of wax for recording, and it was found that for reproduction of music and records designed for frequent repetition with exactness the disk was by many considered more suitable than the cylinder, but the graphophone equipped with the latter became singularly useful as a dictograph, where the correspondence of an office may be dictated to such a cylinder and then be reproduced by a typist who with ear tubes connected with the reproducing machine is able to transcribe the words of the speaker. The term "graphophone," however, has been rather supplanted by that of "phonograph" for cylinder machines and by "gramophone" for disk machines.

It should be stated, however, that there are modern disk machines where the record is vertical, or the path of the needle varies in depth instead of horizontally as in the gramophone. This, however, requires a feed screw for propelling either disk or sound box, as such a groove cannot guide the needle. See TALKING MACHINE.

GRAPH'OTYPE (from Gk. γραφή, *graphē*, writing + τύπος, *typos*, type). A process once employed for producing illustrations using an engraved or high-relief surface, from which printing could be effected on an ordinary press. It was invented by A. H. Wall. Drawings are made on a zinc plate thickly covered with finely powdered French chalk, brought to a hard, firm surface by great pressure. The picture is drawn with a camel's-hair brush and an ink made of glue and lampblack. The uninked portion is then rubbed away and an electrotype made of the picture. This method was only partially successful and has been superseded by other and more modern processes.

GRAP'NEL. See ANCHOR.

GRAP'PIERS CEMENTS. See CEMENT.

GRAPTOLITE, grăp'tô-līt (from Gk. γραπτός, *graptos*, written, marked + λίθος, *lithos*, stone). A class of extinct animals, allied to the hydrozoa, fossil remains of which are found in the Lower Paleozoic rocks, especially in those of Upper Cambrian, Ordovician, and Silurian age. The group derives its name from the likeness of its members to pencil markings on the rocks. They are found most abundantly in black shale formations, and they are of great importance to the geologists because of their numerous species, that follow each other in rapid evolutional series through successively higher formations. Because of these lines of descent and the wide distribution of the species, graptolites are ideal horizon markers or index fossils in the Lower Paleozoic rocks.

The graptolites are delicate hydroid-like colonies growing from a minute embryonal polyp that was incased in a chitinous theca, or cell, called the "sicula." From this sicula grew, by budding, a series of zoöids, or individuals, the form of which is still recognizable in that of their fossilized chitinous coverings, the thecæ. Refined methods of isolation and decoloration of the graptolite colonies have been developed by Holm and Wiman and have enabled these observers to remove the colonies bodily from the inclosing rock and section them in a microtome after much the same methods employed in histology. In this way the structure of the graptolite colonies has been shown to be much more complicated than had been suspected. This is especially true of the first group, the Dendroidea, to which belong sessile colonies with the forms of miniature trees (*Dendrograptus*) or of woven baskets (*Dictyonema*) (q.v.). In these Dendroidea three different forms of thecæ have been found, viz., thecæ proper, or nourishing individuals; alternating canals, considered by Wiman as gonangia, or reproductive individuals; and gemmating, or budding, individuals. Other authors, as Frech, held the alternating canals to have been nematophores. See HYDROID.

The second group, Graptoloidea, consists of the older Dichograptidæ and the younger Diplograptidæ. In the former there grow, by successive forkings, from the sicula, or embryonal cell, which is centrally situated, more or less numerous branches, each of which grows distally (at its extremity) and consists of a single series of thecæ proper. This family, which begins in the Upper Cambrian and does not extend beyond the Ordovician, exhibits a most remarkable evolution from irregular many-branched forms (*Clonograptus*) to symmetrical forms with eight branches (*Dichograptus*), then to four-branched forms (*Tetragraptus*), and finally to biramous species (*Didymograptus*), with which last the family becomes extinct. An aberrant side line from this family is the genus *Phyllograptus*, in which the four branches of *Tetragraptus* become united along their dorsal sides to form colonies with cross-shaped sections.

The younger Diplograptidæ, of which the type genus is *Diplograptus*, possess a central disk which apparently was a "float," and which bore a circle of reproductive sacs (gonangia), containing siculæ and numerous stipes (hydrorhabds). The latter are biserial in *Diplograptus*, each being borne on a long stem (hydrocaule), with a sicula at its farther end, from which the cells grow backward along the stem. The latter forms hence an axis within the stipe, wherefore *Diplograptus* and its allies have been separated, as *Axonophora*, from the preceding forms (Dichograptidæ) without axes, as *Axonolipa*. *Diplograptus* begins in the Middle Ordovician and extends a short distance into the Silurian. It is succeeded by forms possessing the same general structure of the colonies, but with only uniserial arrangement of the cells, the Monograptidæ. These flourished in the Silurian, where their colonies attained a great variety of form. Only the genus *Dictyonema* passes with a few species into and beyond the Devonian system.

The systematic position of the graptolites is uncertain. They are usually classed with the Hydroidea, as they show a general resemblance to some of the members of that group, viz., the Sertularians. The rapid evolution of the graptolites and the different aspects of the faunules of successive beds has permitted the recognition of numerous graptolite zones in the Ordovician and Silurian rocks. In the Swedish Silurian alone 15 zones have been distinguished. Some of the graptolite zones exhibit an astonishingly wide geographical distribution; a like succession of graptolite faunas has been found in Scandinavia, Great Britain, France, North America, and Australia. This extensive distribution, which gives the graptolites great importance for the correlation of geographically widely separated Paleozoic formations, is due to their having been pelagic animals, which were either free-floating or fastened to seaweeds floating in the open ocean. They are in sharp contrast to the great majority of the fossils, corals, mollusks, and crustaceans, which were littoral animals, living in the shallow waters near the shore. For this reason the graptolites are nearly always found separated from other fossils, in a facies or peculiar rock phase of their own, the graptolite shales, mostly dark gray and black carbonaceous shales, upon the bedding planes of which they are crowded in immense numbers.

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Museum, No. 7 and No. 11 (Albany, 1905–08); Elles and Wood, *Monograph of British Graptolites*, ed. by Lapworth (Palæontographical Society, London, 1901–); Bassler, "Dendroid Graptolites of the Niagaran Dolomites at Hamilton, Ontario," *Bulletin of Smithsonian Institution No. 65* (Washington, 1909). Consult also the articles on Hydrozoa; Cœlenterata; Cambrian System; Ordovician System; Silurian System.

GRAS, grȧ, Basile (1836–1901). A distinguished French military officer and inventor. He was born at Saint-Àmans de Pellaga (Department of Tarn-et-Garonne) and was educated at the Ecole Polytechnique and the Ecole d'Application at Metz. His *fusil modèle* (or "Gras rifle"), as it was universally known, was adopted by the French government, and in 1874 the infantry troops were armed with it. It was subsequently displaced by the discovery and introduction of the magazine principle, the Lebel rifle taking its place in the French army. Gras became a professor at the School of Gunnery at Châlons and was appointed a permanent member of the government commission on firearms at that place. In 1888 he was appointed general inspector of the manufacture of small arms, receiving also the rank of general of division. He was a recognized authority in gunnery and small arms and was the author of many important papers and treatises in service magazines.

GRAS, Félix (1844–1901). A writer of the modern Provençal language. He was born at Malemort, Vaucluse, May 3, 1844. After completing his studies at Béziers, he settled in Avignon, where he was for many years a justice of the peace. It was also in this city that he became associated with the founders of the modern Provençal revival. Joseph Roumanille, the so-called father of the Félibrige, was his brother-in-law. He expressed his Republican sentiments in a kind of operatic piece, *La Carmagnole*, the performances of which were stopped by the authorities. His first verses in Provençal appeared in the *Armana Prouvençau* (Provençal Annual), in 1867. In 1876 he published *Li Carbounié*, a narrative poem in 12 cantos, and six years later *Toloza*, a more successful poem, also in 12 cantos, treating of the Albigensian crusade. His best work in poetry is the *Romancero Provençal*, a collection of songs and short pieces. A volume of stories called *Li Papalino*, treating of the days of the popes in Avignon, appeared in 1891. All these writings were published in Provençal with a French translation. In 1891 he succeeded Roumanille as *Capoulié* (chief) of the Félibrige, which position he held until his death. In 1898 appeared his historic novel *The Reds of the Midi*. Singularly enough, it was first published in New York, in the English translation of Mrs. Catharine Janvier. A year later he wrote *The Terror* and *The White Terror*, a sequel to *The Reds of the Midi;* these were published in Provençal, French, and English, the English version being made by Mrs. Janvier. Consult Des Essarts, *Poètes Contemporains: le félibre Félix Gras* (Clermont-Ferrand, 1900). See Félibrige.

GRASBERGER, gräs'bĕr-gẽr, Lorenz (1830–1903). A German classical philologist, born at Hartpennig. He was appointed a professor at the University of Würzburg in 1867. His most important works are a comprehensive history of education in antiquity, *Erziehung und Unterricht im klassischen Altertum* (1864–81), and *Studien zu den griechischen Ortsnamen* (Würzburg, 1888).

GRASHOF, gräs'hōf, Franz (1826–93). A German engineer, born at Düsseldorf and educated at the Industrial School in Berlin. In 1852 he became an instructor and in 1863 professor of applied mechanics, at the Polytechnical School, Karlsruhe, and director of the department of machine construction in that institution. For more than 35 years he was president of the Society of German Engineers, which society upon his death erected a monument to his memory at Karlsruhe. Besides numerous contributions to periodicals and editions of Redtenbacher's *Resultate für den Maschinenbau* (1870 and 1875), he wrote the independent works entitled *Theorie der Elasticität und Festigkeit mit Bezug auf ihre Anwendungen in der Technik* (2d ed., 1878) and *Theoretische Maschinenlehre* (in three parts, 1875, 1883, 1890).

GRASLITZ, gräs'lĭts (Bohemian *Kraslice*). One of the most important manufacturing towns of Bohemia, situated on the Zwodau, 20 miles north of Eger (Map: Austria-Hungary, C 1). It has a school for teaching the making of musical instruments and a museum. Noteworthy among its many manufactures are musical instruments, embroidery, lace, linens, ready-made articles of dress, toys, and mother-of-pearl buttons. In the neighborhood are copper mines. Pop. (town), 1890, 10,009; 1900, 11,803; 1910, 13,825 (district), 1900, 33,333; 1910, 39,216.

GRASMERE, grȧs'mēr. A village near a lake of the same name in Westmoreland, England, 4 miles northwest of Ambleside. It is famous as a favorite residence of the Lake school of poets (Map: England, C 2). Pop., 1901, 781; 1911, 876. The village, picturesquely situated at the head of the lake, contains the ancient church of the *Excursion*, and in the churchyard are the graves of Wordsworth and Hartley Coleridge. The lake, oval in form, with its "one green island," is 1¼ miles long, ½ mile broad, and 130 feet deep. It is girdled by high mountains and forms one of the most beautiful scenes in England, nearly every point of which is celebrated in Wordsworth's poetry.

GRASS. See Gramineæ; Grasses.

GRASS (AS. *græs*, Goth., OHG. *gras*, Ger. *Gras;* ultimately connected with Eng. *green*, *grow*, and with Lat. *gramen*, Gk. *χορτός, chortos*, grass). The herbage or vesture of the soil (*vestura terræ*). It is a part of the soil or land in which it grows and passes, like standing trees and houses, with the freehold. It may be cut by a tenant for life or years without impeachment of waste, but it does not come under the description of an emblement (see Emblements), not being an annual crop which a tenant at will may, after the termination of his lease, gather as the fruit of his labor. The right to take grass from another's land, either by entering, cutting and removing it, or by pasturing one's cattle thereon, is an incorporeal property right of the kind known as a *profit à prendre* and as such may be alienated by the person entitled thereto. See also Common; Incorporeal; Hereditament; Pasture; Profit.

GRASS BASS. See Calico Bass.

GRASS CLOTH. A name often, although erroneously, given to certain beautiful fabrics manufactured in the East from different kinds of fibres, none of which are produced by grasses. One of these fabrics is made from the fibre of *Bœhmeria nivea*, popularly called *ramie* (q.v.), or China grass; another, also known as *piña muslin*, from the fibre of *Bromelia pigna* (*pinguin*). (See BŒHMERIA; BROMELIACEÆ.) The kinds of cloth really made from the fibre of grasses are extremely coarse.

GRASSE, grȧs. The capital of an arrondissement in the Department of Alpes-Maritimes, France, 18 miles west of Nice, and overlooking the Mediterranean, 8 miles distant (Map: France, S., L 5). It is picturesquely situated, and on account of its mild climate a much frequented winter resort. Public buildings of historic and artistic interest are the hospital chapel, with its paintings by Rubens, the parish church, an ancient cathedral, dating from the twelfth and thirteenth centuries, the city hall, a former bishop's palace, and a library of 18,000 volumes. Grasse is one of the largest perfume and essence manufacturing centres of France, and about 60,000 acres in its vicinity are covered with flower gardens. The annual yield is 3,300,000 pounds of roses and 4,400,000 pounds of orange flowers. Considerable quantities of essence of flowers are exported to Cologne and other places. It has also marble quarries and manufactures oil and conserves. The town dates from its settlement by Sardinian Jews in the sixth century. Pop. (commune), 1901, 15,429; 1911, 19,704.

GRASSE, grȧs, EDWIN (1884–). An American violinist, born in New York City. Although he had lost his eyesight in infancy, he took up the study of the violin, under Carl Hauser of New York until 1898 and then under Cesar Thomson at Brussels, Belgium. He won the first prize of the Royal Conservatory, Brussels, in 1900. In 1902 he made his début at Berlin, where he gained immediate success, and afterward he appeared in the principal cities of Europe and America. As a composer, he made himself known through a symphony, a suite for orchestra, a violin concerto, and some chamber music.

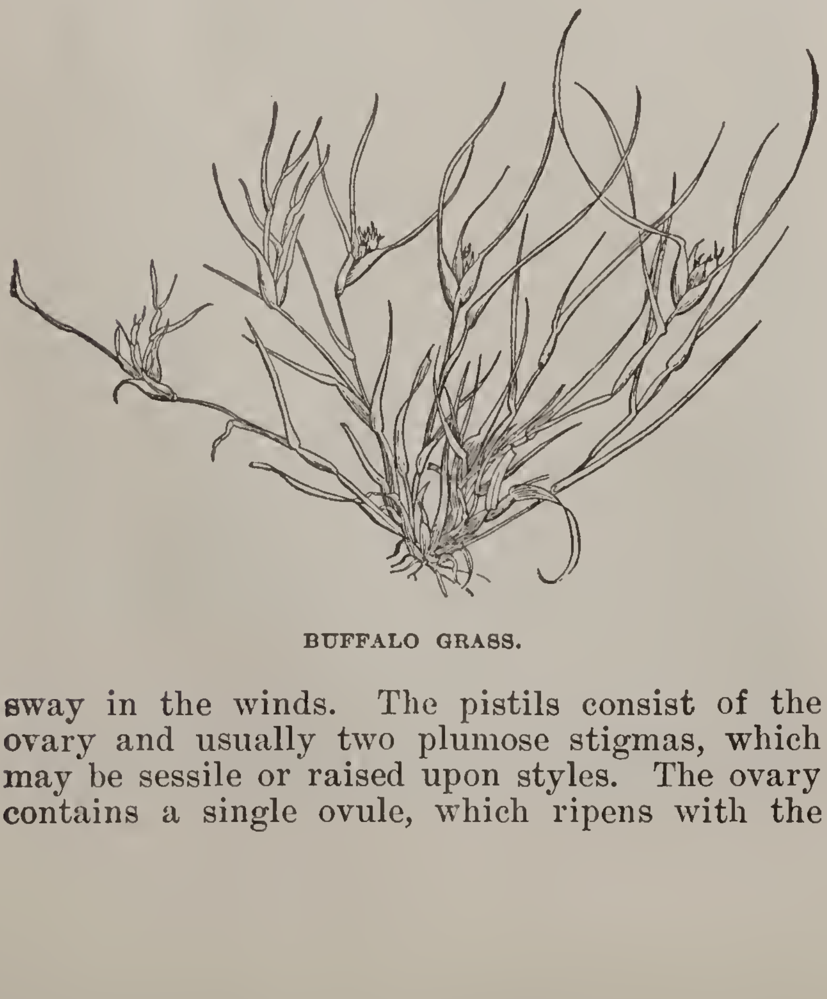
GRASSE, grȧs, FRANÇOIS JOSEPH PAUL, MARQUIS DE GRASSE-TILLY, COUNT DE (1722–88). A French admiral, who commanded the French fleet at the siege of Yorktown during the American Revolution. He was born at Bar in Provence and began his naval career at 15 in the service of the Knights of Malta and served against the Turks. Entering the French navy in 1740, he was promoted to be a lieutenant in 1754 and a captain in 1762. He distinguished himself at Tobago (1781). In this year, with the rank of admiral, he was placed in command of the new French fleet sent to America, which was intended both to reënforce the French in the West Indian waters and to coöperate with Rochambeau on the North American continent. After touching first in the West Indies, the fleet of 29 sail reached Chesapeake Bay on August 30, where De Grasse blockaded the James and York rivers, and on September 5 repulsed an attack of the English fleet under Graves. After rendering invaluable assistance at the siege of Yorktown (q.v.) by preventing the British fleet from relieving Cornwallis and thus permitting him to escape, he sailed away to the West Indies again, where his operations for some time were crowned with great success. Finally, off Santo Domingo, on April 12, 1782, he met the English fleet under Rodney, who signally defeated him and carried him a prisoner to London. Charges of incapacity and even treason were brought against him, and although after a thorough examination he was exonerated by the Council of War, he never again held a naval command. He wrote in his own defense a *Mémoire justificatif* (1782). Consult: *The Operations of the French Fleet under De Grasse in 1781–82*, in "Bradford Club Series," No. 3 (New York, 1864); *Magazine of American History*, vol. vi (ib., 1811); Winsor, *Narrative and Critical History of America*, vol. iv (London, 1886–89).

GRASSERIE, grȧs′rē′ (Fr.). A disease of silkworms, not contagious and not hereditary and apparently produced by a lowering of the temperature of the rearing room. Affected worms crawl slowly and have a stretched, thin skin. A liquid exudes through the skin, soiling the food and the neighboring worms. Proper regulation of the temperature is the remedy. See SILKWORM.

GRASS′ES (*Gramineæ*). A family of plants, which contains more than 350 genera and 4700 species. Its members vary in size from moss-like specimens less than an inch in height to gigantic bamboos 100 feet or more tall. They are distributed over nearly the whole world; some are characteristic of the hottest tropical regions, others of the far north and south, in the vicinity of almost perpetual snows. In number of specimens they are most abundant in the north temperate zone, where they clothe with verdure immense tracts of prairie, meadow, and steppe, and may be found growing or may be made to grow on almost every kind of soil. Some species are peculiar to dry, sterile soils; others will flourish only in rich soils with abundant moisture. Some grow in marshes, stagnant water, or slow streams, and others only along the seacoast. None are truly marine. Some are annual, others perennial. The roots of all grasses are fibrous. Many have more or less thickened underground rootstocks or rhizomes, which are not true roots; but modified stems, from which roots are sent out and from which new plants may arise under conditions favorable to propagation. The stems, which usually branch more or less at their bases, are round or slightly flattened, jointed, and hollow between the joints except in maize, sorghum, and a few other species. The parts of the stem between the joints, or nodes, are called the internodes. The stem elongates by growth at the base of the internodes. From the nodes, or joints, arise the leaves and branches. In some grasses roots are put out from the joints when near or lying upon the ground. If a stem is bent or broken so as to lie upon the ground, growth at once begins in the lower side of the stem and is rapidly continued until the stem again assumes an upright position. In most grasses the stems are herbaceous; in the bamboos and some other species they are woody. The leaves consist of two parts, the sheath and the blade. The sheath, which is split on the opposite side from the blade, invests the stem and protects the lower growing portion of the internode. At the top of the sheath is usually found a thin membranous prolongation, called the ligule. The leaf blade is usually long and narrow, with nearly parallel longitudinal veins.

Many grasses are provided with peculiar adaptations to protect them against drought and hot winds. Between the veins on one side or the other are large, thin-walled cells that keep the leaf expanded when normal conditions are present. When dried by hot winds, they collapse and cause the leaf to roll its margins inward, thus protecting it against too great evaporation. When rain comes, the cells swell out and cause the leaf to return to its normal shape. The position of the leaves upon the stem in grasses is opposite and two-ranked—a character by which grasses may be distinguished from sedges, which have three-ranked leaves. Lawn and meadow grasses have leaves that grow constantly from their bases, so that when cut they quickly elongate instead of remaining in the shorn condition. Grass flowers possess only the essential organs, i.e., stamens and pistils; the scales and bracts surrounding them are reduced and modified leaves. The flowers of some grasses have both stamens and pistils; others have the staminate and pistillate flowers upon different parts of the plant, as in the case of maize, in which the tassel consists of staminate flowers and the silk of the ears of the pistillate flowers. Still others have them upon different individuals. The usual number of stamens in the flower is three, but the number varies from one to six, and in some genera they may be from 20 to 30. The anthers, which are usually conspicuous, are generally attached by the middle of their backs to the slender filaments, so that they sway in the winds. The pistils consist of the ovary and usually two plumose stigmas, which may be sessile or raised upon styles. The ovary contains a single ovule, which ripens with the ovary wall, or pericarp, into a true caryopsis. The flowers are arranged in spikelets, which contain one or more flowers. At the base of each flower is a bract, or reduced leaf, called the flowering glume, and at the base of each spikelet are commonly found two empty glumes. The axis, or stem that carries the glumes, is called the rachilla. Between the rachilla and the individual flower there is a small, nerved, membranaceous bract called the palea, or palet. The glumes, which vary exceedingly in different species, may have awns (bristle-like appendages, as the "beard" of wheat) or may be sharp-pointed or rounded, entire or toothed, at their apexes.

PAMPAS GRASS.



BUFFALO GRASS.

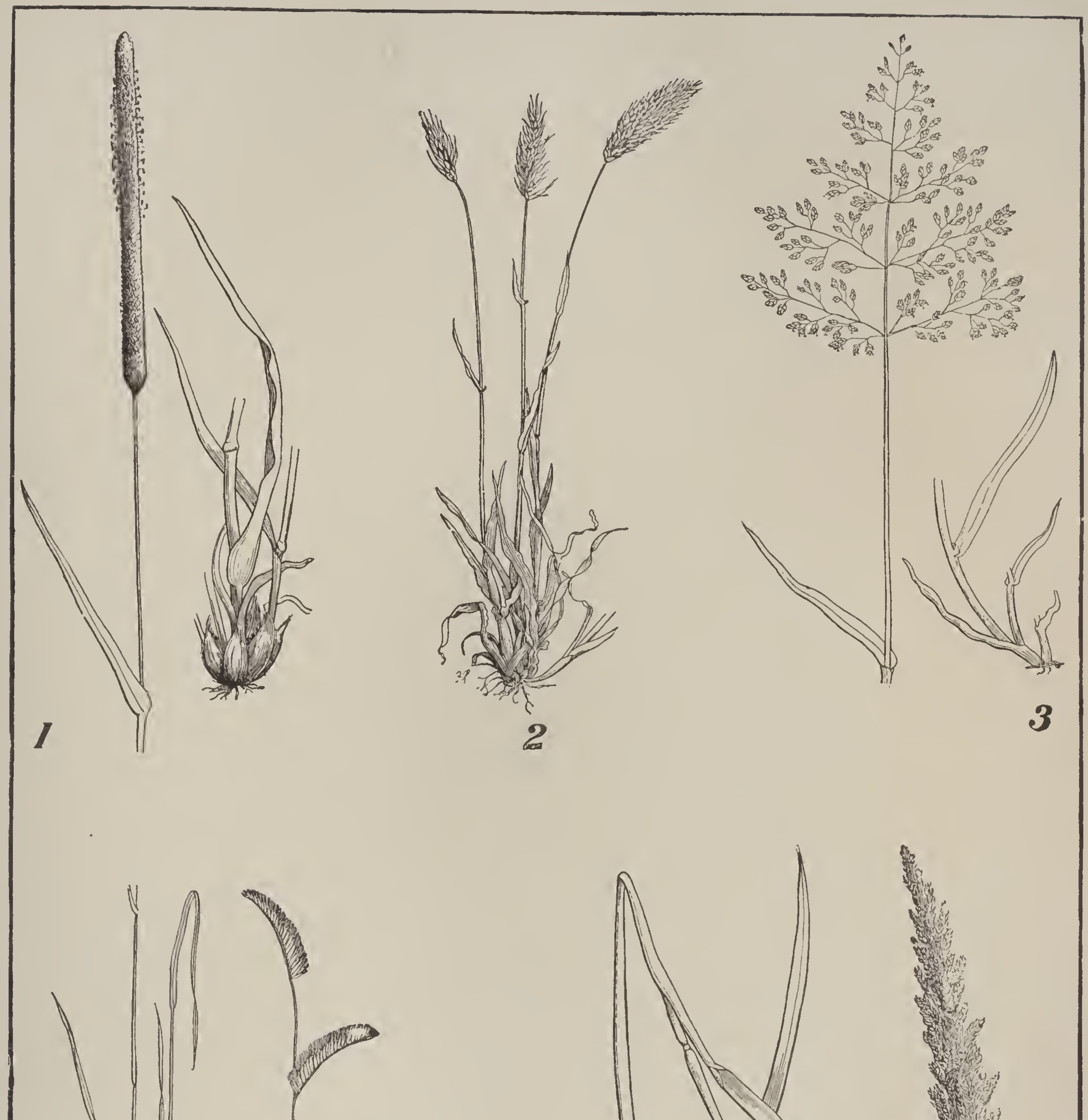
All of these characters are of importance in determining the species of grasses. The arrangement of the spikelets in the head, as it is often improperly called, is varied. They may be sessile along the axis, as in wheat, forming a spike; they may all be arranged on one side of the axis, or rachis, forming a raceme, or the rachis may branch widely into a panicle, as in oats, blue grass, etc., and there are many intermediate forms between these. According to their most common uses grasses may be divided into lawn, pasture, and hay grasses. Among the more common grasses suited to lawns are blue grass, Rhode Island bent grass, redtop, Bermuda grass, St. Augustine grass, and buffalo grass. Pasture grasses include redtop, blue grass, bent grass, fescue, orchard grass, brome grass, Bermuda grass, grama grass, rye grass, blue stem, and mesquit. Hay grasses include timothy, orchard grass, redtop, blue grass, brome grass, Johnson grass, tall oat grass, meadow fescue, meadow foxtail, rye grass, Guinea grass, crab grass, crested dog's tail, etc. In addition many grasses are especially suited to binding sands and embankments. Grass seed as usually obtained consists of the grain, with more or less chaff closely enveloping it. The seed proper consists of a small embryo, which lies at the base and nearly outside of the starchy endosperm, and the endosperm with its adhering pericarp. Upon the nature of the endosperm depends the great importance of some of the grasses in supplying various food grains to man.

FEEDING VALUE OF GRASSES

Grasses of many kinds are used for pasturage, for soiling, and for hay. They constitute a very important group of feeding stuff for all farm animals. The feeding value of grasses commonly used for forage is shown by the average percentage composition of the following kinds: *Kentucky blue grass* contains: water, 65.1 per cent; protein, 4.1 per cent; fat, 1.3 per cent; nitrogen-free extract, 17.6 per cent; crude fibre, 9.1 per cent; ash, 2.8 per cent. *Fescue* contains: water 69.9 per cent; protein, 2.4 per cent; fat, 0.8 per cent; nitrogen-free extract, 14.3 per cent; crude fibre, 10.8 per cent; ash, 1.8 per cent. *Timothy* (a hay grass) contains: water, 61.6 per cent; protein, 3.1 per cent; fat, 1.2 per cent; nitrogen-free extract, 20.2 per cent; crude fibre, 11.8 per cent; ash, 2.1 per cent. It will be seen that the three examples selected do not differ markedly in composition, and other grasses resemble them more or less closely.

Experiment has shown that about 64 per cent of the total dry matter, 48 per cent of the protein, 66 per cent of the nitrogen-free extract, and 56 per cent of the crude fibre of timothy is digested.

GRASSES



1. TIMOTHY
2. SWEET VERNAL

5 ROUGH LEAVED GRASS

3. KENTUCKY BLUE GRASS
4. GRAMA GRASS

Similar results have been obtained with other grasses. It may therefore be said that, judged by palatability, composition, and digestibility, grass fully deserves the high opinion in which it is held as a green fodder.

Like most green feeds, grasses have a high water content. Their feeding value depends largely upon the carbohydrates present (both nitrogen-free extract and crude fibre), though they also furnish an appreciable amount of protein. Like other succulent feeds, grasses have a value other than that derived from their composition; viz., they stimulate the appetite. The improvement often observed in the appearance of cattle when turned out to pasture in the spring is probably due in large measure to the fact that the appetite is increased by the succulent and agreeable flavor of the green feed, and thus the total amount of nutritive material consumed in a day is greater than when they are fed dry feeding stuffs. If pasturage is abundant, cattle and sheep will not need other feed. If such is not the case, owing to drought or other causes, pasturage should be supplemented by other feeds. Generally speaking, grass increases in nutritive value until the seed is nearly ripe; i.e., the plant continues to elaborate nutritive material until it has perfected its seeds. The plant then "ripens"; i.e., it ceases to form new nutritive material and by the action of rain, dew, sunlight, etc., loses more or less of that already formed. There may also be transfer of nutritive material from the stalks to the root. Some grasses, such as Bermuda grass, continue to grow throughout the season. Other grasses, e.g., buffalo grass, cure in their natural habitat without appreciable loss of nutritive material. Most pasture, lawn, and hay grasses make new growth if cut or eaten off by stock. See PASTURE, PASTURAGE; SOILING, SOILING CROPS.

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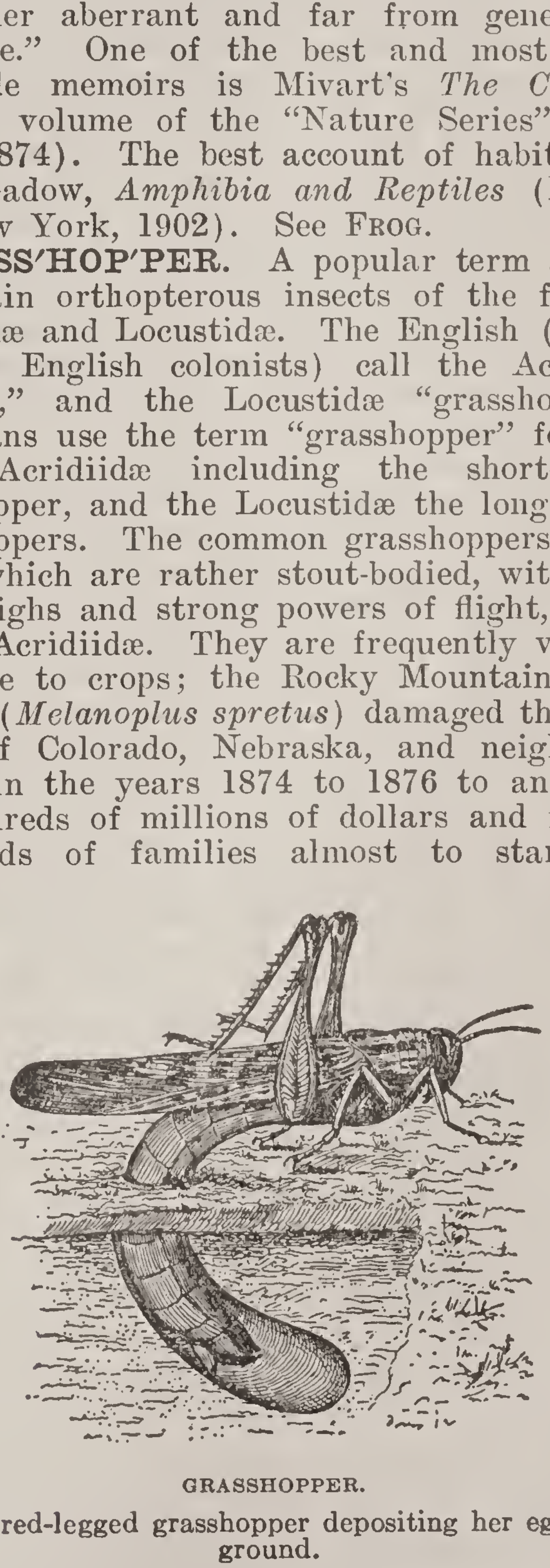
GRASS FINCH. One of the most widespread and familiar sparrows of North America (*Poœcetes gramineus*). It lives in the fields and grassy opens, making its nest between the grass stems and feeding upon seeds and insects. Its habit of singing pleasantly in the early evening led Wilson Flagg to bestow upon it the name "vesper sparrow." It had earlier been known as the "bay-winged bunting" on account of the rufous wing coverts. It may be recognized among its brown and streaked congeners by the white outer feathers of its tail displayed in flight. See GRASSQUIT; and Plate of SPARROWS.

GRASS FROG. The common European brown frog (*Rana temporaria*), which is highly variable in color and possesses great power of color adaptation (metachrosis). It is essentially terrestrial in habits and manifests many very interesting traits. Its range is extensive, covering all central Europe and Asia to Japan, and rising to the height of 10,000 feet in the Italian Alps. It may become a most interesting and intelligent pet in captivity. "Next to man," says Gadow, "there is no animal which has been studied so minutely, and has had so many primers and textbooks written upon it; in spite of all this, it is very little understood, thanks to its rather aberrant and far from generalized structure." One of the best and most easily accessible memoirs is Mivart's *The Common Frog*, a volume of the "Nature Series" (New York, 1874). The best account of habits, etc., is by Gadow, *Amphibia and Reptiles* (London and New York, 1902). See FROG.

GRASS'HOP'PER. A popular term applied to certain orthopterous insects of the families Acridiidæ and Locustidæ. The English (including the English colonists) call the Acridiidæ "locusts," and the Locustidæ "grasshoppers." Americans use the term "grasshopper" for both —the Acridiidæ including the short-horned grasshopper, and the Locustidæ the long-horned grasshoppers. The common grasshoppers of the fields, which are rather stout-bodied, with large hind thighs and strong powers of flight, belong to the Acridiidæ. They are frequently very destructive to crops; the Rocky Mountain grasshopper (*Melanoplus spretus*) damaged the grain crops of Colorado, Nebraska, and neighboring States in the years 1874 to 1876 to an extent of hundreds of millions of dollars and reduced thousands of families almost to starvation. Allied species have done similar damage in the Argentine Republic, in South Africa, and in Algeria in recent years, and in southeastern Europe in former times. The best remedial measures in use at present consist in late fall plowing, to break up the egg clusters; in dragging specially constructed coal-oil pans through



GRASSHOPPER.

A female red-legged grasshopper depositing her eggs in the ground.

the fields to collect the young grasshoppers; and in poisoning the insects by means of a bait consisting of moistened bran and arsenic.

The commonest species in the eastern United States is the red-legged grasshopper (*Melanoplus femur-rubrum*), which quite closely resembles the destructive Western species, but which has shorter wings. Its eggs are laid in the autumn in a compact pod beneath the surface of the ground, and the young, which are hatched in the spring, molt four or five times and reach the full-grown winged condition in late July or August. Some of the eggs in the North may hatch in the autumn, showing a tendency towards a second generation, which probably develops in the southern part of the range of this insect. The red-legged grasshopper sometimes occurs in such great numbers as seriously to damage pasture lands in the restricted localities. See Locust.

The long-horned grasshoppers (family Locustidæ) include those slender green forms with long antennæ called the "meadow grasshoppers," and the interesting group ordinarily called "katydids" (see Katydid), as well as the dark-colored wingless forms found under stones and in the woods and in caves and which are known as the "cricket-like" grasshoppers, or "cave crickets." Another group belonging to this family contains certain hard-bodied insects of strange appearance, known as the "shield-backed" grasshoppers, "Western crickets," or "sand crickets." One of the latter, belonging to the genus *Stenopelmatus*, is in the West supposed to be poisonous, although, as a matter of fact, it is perfectly harmless.

Fossil grasshoppers of the family Acridiidæ are known in fragmentary condition from rocks of as early age as the Lias of Switzerland and the Oölite of England, and members of the family Locustidæ have been found sparingly in the Jurassic limestones of Solenhofen, Bavaria. Several species of each family are known from the Tertiary rocks of North America and Europe, but none of either have been found in the amber. Nearly all the more important subdivisions of the two families mentioned are included among the Tertiary fossils. See Orthoptera.

Consult: *First Report United States Entomological Commission* (Washington, 1877); Hyatt and Arms, *Insecta* (Boston, 1890); Sharp, "Insects," in *Cambridge Natural History*, vol. v (London, 1895); Scudder, *Guide to the Genera and Classification of the North American Orthoptera* (Cambridge, 1897); Howard, *The Insect Book* (New York, 1901); Blatchley, "Orthoptera of Indiana," in *Twenty-seventh Annual Report of Department of Geological and Natural Resources, Indiana* (Indianapolis, 1902); Kellogg, *American Insects* (New York, 1908); Walden, "Orthoptera of Connecticut," in *Bulletin 16, Connecticut Geological and Natural History Survey* (Hartford, 1911). See also the bibliography under Orthoptera.

GRASSHOPPER LARK. See Grasshopper Warbler.

GRASSHOPPER SPARROW. Any of two or three of the smaller American sparrows which live in grassy fields, and whose rattling notes resemble those of a locust or a "grasshopper." The commonest one is the yellow-winged sparrow (*Ammodramus savannarum australis*), which is about 5 inches long, pale brown and streaked in color, with the front edge of the wing conspicuously yellow, and which conceals itself most of the time in the field and roadside herbage. See Sparrow.

GRASSHOPPER WARBLER. A European warbler (*Locustella nævia*), common in Great Britain. It haunts the reedy banks of streams, where it conceals itself and its nest with great skill among the herbage. Its notes are almost the same as those of a locust. It appears erroneously in many books as "grasshopper lark," but is of the family Sylviidæ and not at all related to the larks. Consult Howard, *The British Warblers* (London, 1907–14).

GRASSI, gräs′sē, Battista (1855–). An Italian zoölogist. He was educated at Como and at the University of Pavia, and became professor of comparative anatomy at the University of Rome, and director of the Institute of Comparative Anatomy. He was made a senator of the Kingdom of Italy. Several years were devoted by him to the bionomics and life history of the white ants (Termitidæ). He discovered (1893–96) that the young are all born alike, and that the differences between the workers, etc., when heredity or selection does not operate, result from differences in the food. He also proved that an individual can by change of food be made into a soldier after it has visibly undergone one-half or more of its development into a winged sexual form. He, with Calanduccio, proved in 1887–96, what had already been suspected in 1864 by Gill, that a minute fish, *Leptocephalus*, is the larva of the eel, and that females of eels can mature only in depths of at least 500 meters. For these discoveries he was elected a foreign member of the Royal Society of London. His researches, made in 1898–1900, on the sporozoan malarial parasite of the mosquito (see Sporozoa) are of great scientific and practical value. He independently proved that the mosquito (*Anopheles*) transmits malaria, and that, by the use of wire gauze as a covering for windows, doors, and chimneys of houses, the worst malarial regions of Italy can be rendered as healthy as any other part of the country. He also proved the transmission of filariæ of the blood by the same *Anopheles* (*Anopheles claviger*), which is the host of this microparasitic worm. His publications are devoted to a discussion of his researches.

GRASS′LANDS′. One of the three great climatic landscape types—deserts, forests, grasslands—into which Schimper, in his work on plant geography, divides the world. It is not yet clearly known what determines the presence of trees or of grasses in a given locality. Schimper, perhaps, has the most tenable hypothesis for the origin of grasslands, viz., that they occur in regions where dry winter winds preclude the presence of forests. Since grasses are shallow-rooted, they do not require a moist subsoil, such as trees do, and since they are of low stature, they are protected from the desiccating influence of wind. The greatest development of grasslands is in the temperate zone and commonly in continental interiors. Ecologically speaking, the pure climatic grasslands of the world are essentially similar, though the species found in them vary with the country. In different lands, as is well known, they have various names, of which those that have come to be of most importance to students of phytogeography are prairie, steppe (qq.v.), and pampas. One speaks of the pampas of Argentina, the prairies of North America, and the steppes of Europe and Asia. In all these, however, the general life conditions are similar, and there is no essential reason for more than one title. A type of formation which differs essentially from that just described is the savanna (q.v.), which is intermediate between forest and grassland and is located in a transitional climate. Many of the llanos and campos of northern South America are true savannas, while others are essentially grasslands. In general, savannas are as characteristic of tropical regions as pure grasslands are of temperate. Again, there are edaphic grasslands, e.g., river meadows and swamps of lake origin. Through the influence of man many artificial grasslands are to be found, e.g., pastures and most meadows. Perhaps edaphic river savannas are to be classed here also. See DISTRIBUTION OF PLANTS.

GRASSMANN, gräs′män, HERMANN GÜNTHER (1809–77). A German mathematician and Sanskrit scholar, born at Stettin. He was a son of JUSTUS GÜNTHER GRASSMANN (died 1852 at Stettin), who was well known for his work in crystallography. The young Grassmann devoted his attention at first to theology and philosophy, which he began studying in Berlin in 1827. He then turned his energies to mathematics, which he taught successively at the industrial school in Berlin, at the Ottoschule in Stettin, and at the Stettin Gymnasium. He is known chiefly for his work *Die Wissenschaft der extensiven Grössen oder die Ausdehnungslehre* (1844 and later editions). The obscure style of this treatise was such as to cause the first edition to pass practically unnoticed, and it was not until the theory of quaternions (q.v.) began to be recognized that Grassmann's allied theory attracted attention. In later life he took up the study of Sanskrit and published a *Wörterbuch zum Rigveda* (Leipzig, 1875), which is a remarkable example of a combined dictionary and concordance and is still indispensable to all Sanskrit scholars, and an *Uebersetzung des Rigveda* (2 vols., 1876–77), which is based on the principles of the so-called linguistic school of Vedic interpretation and is likewise a work of much value. Grassmann was also the discoverer of one of the most important laws of comparative linguistics, which is still known as Grassmann's law (q.v.). His other works include the following: "Neue Theorie der Elektrodynamik" (Poggendorff's *Annalen*, vol. lxiv); "Theorie der Farbenmischung" (same journal, vol. lxxxix); *Geometrische Analyse, geknüpft an die von Leibniz erfundene geometrische Charakteristik* (1847); *Lehrbuch der Arithmetik für höhere Lehranstalten* (Berlin, 1861); *Lehrbuch der Arithmetik und Trigonometrie* (1861–65). A collection of his works on mathematics and physics was published at Leipzig in 1894. Consult Schlegel, *H. Grassmann, sein Leben und seine Werke* (Leipzig, 1878).

GRASSMANN, ROBERT (1815–1901). A German mathematician, brother of Hermann Grassmann. He was born at Stettin. After devoting himself to the profession of teaching in 1841–48, he went into journalism and became editor of the *Stettiner* and the *Pommersche Zeitung*. His researches, especially those on the theory of arithmetic, are important and reveal considerable originality. He also wrote a number of works on special sciences, including: *Die Formenlehre oder Mathematik* (1872); *Die Weltwissenschaft oder Physik* (2 vols., 1862–72); *Die Lebenslehre oder Biologie* (1872); *Die Wissenschaftslehre oder Philosophie* (1876); *Das Weltleben oder die Metaphysik* (1881); *Das Pflanzenleben* (1882); *Das Gebäude des Wissens* (10 vols., 1882–90).

GRASSMANN'S LAW. A phonetic law, formulated by Hermann Grassmann (q.v.) in 1863, regarding the aspirated mutes or explosives of the Indo-Germanic consonant system. This law he defined thus: If an Indo-Germanic root had originally two aspirated mutes, only one aspirate was retained in Indo-Iranian and in Greek. There seems to be no law as to which aspirated mute shall be retained. Examples of the phenomenon explained by the law are very numerous. Thus there may be cited Skt. *kumbha*, Gk. *κύμβος*: Av. *xumba*, pot; Skt. *gabhasti*, arm; Lat. *habere*, to have; Lat. *fingere*, to form: Goth. *deigan*, to knead; Skt. *bāhu:* Gk. *πῆχυς*, arm; Skt. *budhna*, Gk. *πυθμήν*: Lat. *fundus*, bottom; Skt. *sahatē*, Gk. *ἕξειν* for Gk. **ἕκ-σειν*: *ἕχειν*, to have; Gk. *θρίξ*: pl. *τρίχες*, hair; Skt. *duhitar:* Gk. *θυγατήρ*, Goth. *daúhtar*, daughter; and many others. The law appears very clearly in the reduplication of Sanskrit and Greek verbs which have an initial aspirate mute. Thus, Skt. *chandati*, pleases: perfect *cachanda;* Skt. *bhavati*, Gk. *φύει*, becomes: perfect *babhūva*, *πέφυκα*; Skt. *bhujati*, Gk. *φεύγει*, bends, flees: perfect *bubhōja*, *πέφευγα*; and the like. By the operation of onomatopœia, inflection, assimilation, and so forth, many words violate the principle involved in Grassmann's law, as Skt. *jharjhara*, drum, *kumbhābhis*, with pots, Gk. λιθωθῆναι, to be stoned, *θηθίς*, aunt, besides the literary *τηθίς*. The Sanskrit grammarians were already familiar with this principle, and the Greek scholar Buttmann (q.v.) also had made such explanations as *τρέφειν*, *θρέψειν*, from **θρεφ-*, before Grassmann, who, however, by his exact enunciation of the law, is rightly accredited with the full discovery of the principle. See PHONETIC LAW.

GRASS MOTH. A family (Crambidæ) of small moths, of which the species are numerous, inhabiting pastures, where they are often seen to rise in great numbers when disturbed and soon to settle again on the blades of grass. Their form, when their wings are closed, is long and narrow, pointed at the head, abruptly cut off at the opposite end. They are often brown and white, sometimes silvery and golden.

GRASS OIL, LEMON GRASS OIL, better known as CITRONELLA. A pale yellow to greenish aromatic oil of the terpene class, distilled from various fresh grasses, such as *Andropogon nardus*, *Cymbopogon nardus*, etc., which are extensively cultivated in Ceylon, Java, and the Straits Settlements. The plants yield from 0.5 to 1 per cent of oil. Citronella has a specific gravity varying from 0.885 to 0.910; a rotation of 0 to — 21 degrees, and a refractive index of 1.465 to 1.482. The oil consists largely of citronellal and geraniol, with smaller proportions of camphene, dipentene, and limonene, besides traces of boneol, methyl eugenol, etc. The composition for the standard varieties of citronella has been given as follows:

	Java oil	Ceylon oil
Geraniol........................	26–44%	27–39%
Citronellal....................	23–50%	5–10%

(Schimmel's *Report*, Leipzig, April, 1914.)

The lemon-like odor is due to the aldehyde citronellal. Of late years Ceylon citronella has been adulterated with Russian petroleum up to

15 per cent. At one time it was claimed that this falsification could be detected by the solubility test with 80 per cent ethyl alcohol, but later experiments show the test to be unreliable, and it is being largely replaced by the acetyl value. Citronella is extensively used in perfuming low-priced soaps and is much depended upon by manufacturers to overcome the disagreeable odor of rosin in household laundry soaps. As an adulterant of high-priced perfumery oils, e.g., verbena, its use is too extensive.

GRASS OWL. A typical owl (*Strix candida*) of India and eastward, resembling the barn owl and almost invariably found in long grass.

GRASS PARRAKEET. See Parrakeet.

GRASS PICKEREL. The common small pike (*Lucius reticulatus*) of the eastern United States. See Pickerel.

GRASS′QUIT′ (from *grass* + *quit*, apparently imitative of the note). A diminutive finch or seed eater (q.v.) of the genus *Sporophila* (or some closely allied genus), abundant in the warmer parts of America and in the West Indies. The grassquits are only about 4 inches long, and are not bright-colored, black, white, olive, and gray being the predominant shades. They feed on seeds and have very little power of song. But they are interesting and sociable little birds and are frequent around houses. They build large domed nests, and lay five or six speckled eggs. They are also called pygmy finches and grass finches.

GRASS SNAKE (so called from its home). 1. One of the garter snakes (see Garter Snake). The name especially of the unstriped greenish-brown variety of *Eutœnia sirtalis.* This is usually taken as the typical form and divided into four or more subspecies. The typical yellow and black longitudinal stripes are nearly or quite wanting; but three series of small, square, dark blotches run along each side. The abdomen is greenish white, with black spots near each end of the abdominal scales. The green snake is sometimes called grass snake.

2. The common European species of water snake, so called in Great Britain, where it is the only serpent except the adder. See Water Snake.

GRASS SNIPE. A name among American gunners for several shore birds frequenting grassy places, most commonly perhaps for the pectoral sandpiper, or jack snipe (*Tringa*, or *Pisobia, maculata*). See Sandpiper; Pectoral Sandpiper; Jack Snipe.

GRASS SPONGE. A commercial name for several North Indian sponges (allied to the sheep's-wool and velvet sponges), which grow upon hard bottoms among the eel grass and are marked outwardly by vertical ridges. One is *Spongia graminea;* another, *Spongia equina,* exhibits a puzzling number of varieties. All of the grass sponges are of inferior quality.

GRASS STAGGERS. Cerebro-spinal meningitis. See Meningitis.

GRASS TREE (so called from the grasslike foliage), *Xanthorrhœa.* A genus of the family Liliaceæ, natives of Australia, Tasmania, and New Zealand, which constitute a very peculiar feature in the vegetation of that part of the world. There are about a dozen species, of which the widest known are *Xanthorrhœa arborea, Xanthorrhœa pumilo, Xanthorrhœa tateana,* and *Xanthorrhœa hastilis.* They have upright stems, which bear tufts of long narrow foliage at the summit, somewhat resembling small yuccas; a long cylindrical spike of densely aggregated flowers surmounts the centre of the tuft of leaves. The base of the inner leaves of some species is edible, and forms, particularly when roasted, an agreeable article of food. The centres contain as much as 5 per cent of sugar, which has been utilized to some extent. All the species abound in a resinous juice, which on exposure to air hardens into a reddish-yellow, inodorous substance, with a shining fracture, soluble in alcohol, and useful as a tonic in dysentery, diarrhœa, and other intestinal maladies; used also by the natives of Australia for uniting the edges of wounds, and with a clayey earth for calking their canoes, and as a cement for various purposes. This substance, usually called grass-tree gum, burns brightly and has been used for candles. If treated with nitric acid, it is almost completely transformed into picric acid, and it was thus employed before the process of making picric from carbolic acid had been discovered. Grass-tree gum has also been used for making varnishes. The common grass tree (*Xanthorrhœa hastilis*), also called "black boys" in Australia, has a stem about 4 feet high, but sometimes a foot in diameter. It is of very slow growth and is supposed to be several centuries old when it has reached such dimensions. Several species are found growing between the coastal ranges and the sea in eastern, southern, and southwestern Australia.

GRASS-TREE GUM. See Grass Tree.

GRASS VALLEY. A city in Nevada Co., Cal., 65 miles by rail north by east of Sacramento, on the Nevada County Narrow Gauge Railroad (Map: California, D 3). It has a public high school, library, Mount St. Mary's Academy, and Grass Valley and St. Patrick's orphan asylums. The city is in the richest gold-quartz-mining region of California and has extensive fruit-growing and mining interests and quartz mills. Grass Valley was settled in 1849 and incorporated in 1861. It owns its water works. Pop., 1900, 4719; 1910, 4520.

GRASS WARBLER. One of the small insect-eating birds of the genus *Cisticola,* most of the species of which inhabit Africa. These birds resemble finches in their ground-keeping habits and metallic notes, from which they receive the name "pinc-pinc." The group is allied to the tailor birds, and all the species build remarkable nests. See Fantail.

GRASS WORM. A common insect of the southern United States, which injures the grasses and small grains. It is the larva of a noctuid moth (*Laphygma frugiperda*) and is therefore allied to the cutworms (q.v.). It frequently occurs in enormous numbers and marches in armies, from which habit it is sometimes called the Southern army worm in contradistinction to the Northern army worm (*Leucania unipuncta*). See Army Worm.

GRASS WORM.

GRATE (from ML. *grata*, variant of *crata*, grating, crate, from Lat. *cratis*, hurdle; connected with Gk. *κύρτη*, *kyrtē*, fishing basket, Skt. *kart*, to spin). The iron bars constituting the floor of a fire box or furnace, on which the fuel rests, and through which it receives its supply of oxygen for combustion. The iron cage which holds fuel, especially coal, in a fireplace is also called a grate. See Furnace; Stoker, Automatic; Boiler.

GRATEFUL SERVANT, The. A comedy by James Shirley licensed in 1629, under the title of *The Faithful Servant*, and printed in 1630.

GRATIÆ, grā'shĭ-ē. See Charis; Charites; Graces.

GRATIAN. The name of two Roman emperors. See Gratianus; Gratianus Augustus.

GRATIAN, grā'shĭ-*a*n (Lat. *Gratianus*). The collector of the well-known body of canon law commonly cited under the title of *Decretum Gratiani.* In spite of the fact that he was the most celebrated canonist of the Middle Ages and was styled "the master" and was regarded as the founder of canon law, little is known of his life. He lived in the first half of the twelfth century, was a monk in the monastery of St. Felix at Bologna, and probably a teacher of canon law at Bologna. The *Decretum* is his only known work. The many details which have been added to this bare outline of his life are legendary. Although he was uncritical in the use of his sources, his ability is clearly apparent in his works. No other private compilation has exercised so great and so enduring an influence. The official *editio Romana* of the *Decretum* (1582) was prepared after the Council of Trent by a committee of cardinals; there is a critical edition by Friedberg in his *Corpus Juris Canonici* (Leipzig, 1879). See Canon Law.

GRATIANO, grā'shĭ-ā'nō̇. 1. The stock "bore" of Italian comedy. 2. The friend of Bassanio and lover of Nerissa in Shakespeare's *Merchant of Venice.* 3. The brother of Brabantio and uncle of Desdemona in Shakespeare's *Othello.*

GRATIANOPOLIS. See Grenoble.

GRATIANUS, grā'shĭ-ā'nŭs (?–407). A Roman general, whom the Roman legions in Britain proclaimed Emperor in opposition to Honorius. At the end of four months he was put to death by his soldiers, in the year 407.

GRATIANUS AUGUSTUS (359–383 A.D.; Roman Emperor 367–383 A.D.). Eldest son of Valentinian I, by his first wife, Severa. He was born at Sirmium in Pannonia. While he was still *nobilissimus puer,* or heir apparent, he was created consul, and in 367 was elevated by his father to the rank of Augustus (joint Emperor) at Ambianum (Amiens), in Gaul. In the following year he accompanied his father in his expedition against the Alemanni (q.v.), in order that he might be accustomed to warfare. On the death of Valentinian, Gratianus became senior ruler of the Western Empire, with his half brother Valentinian II (q.v.) as his colleague. Gaul, Spain, and Britain fell to Gratianus' share; and, as Valentinian was only four years old, Gratianus was practically the sole ruler in the West, fixing his residence at Treviri (now Treves), while the East continued to be ruled by his uncle, Valens (q.v.). During the first part of his reign Gratianus carried on fierce warfare against the tribes who possessed the Danubian Provinces and Illyricum; and he was on the point of marching into Thrace to assist Valens against the Goths when he was suddenly called upon to defend his dominions against the Lentienses, a tribe of the Alemanni. After the invaders had been defeated (378), Gratianus advanced towards the Eastern Empire, but while on the way he learned that his uncle Valens had been defeated and killed by the Goths (q.v.) near Adrianople (Aug. 9, 378). The sovereignty of the Eastern Empire then devolved upon Gratianus, but, feeling his inadequacy to the task of ruling the whole Empire, he recalled Theodosius (q.v.) from Spain and appointed him his colleague on Jan. 19, 379. Gratianus possessed some admirable virtues, but his character was yielding and pliant, and he was often led to the commission of acts of cruelty and tyranny. In Gratianus' reign orthodox Christianity for the first time became dominant throughout the Empire. But his persecution of the pagans and afterward of heretic Christians alienated the affections of his subjects generally, while his fondness for frivolous amusements and unworthy associates excited the contempt of the army, so that when Maximus (q.v.) was proclaimed Emperor by the legions in Britain crowds of the disaffected flocked to his standard. Gratianus was defeated by him near Paris and afterward fled to Lugdunum (Lyons), where he was overtaken and killed by Andragathius, whom Maximus had sent in pursuit of him, on Aug. 25, 383. For the reign of Gratianus, consult Gibbon's *Decline and Fall of the Roman Empire,* as edited by Bury (London, 1912), and *Cambridge Mediæval History,* vol. i (New York, 1911).

GRATIEN, Henri. See Bertrand.

GRATING, Diffraction. See Diffraction and Diffraction Gratings; Dividing Engine; Light.

GRATI'OLA (Neo-Lat., from Lat. *gratia*, grace). A genus of plants of the family Scrophulariaceæ. *Gratiola officinalis,* sometimes called hedge hyssop, is found in meadows and on the margins of ponds and river banks in most parts of Europe, where it is said to render some of the meadows useless as pastures on account of its extreme bitterness and its violent action as a purgative, diuretic, and emetic. In overdoses it is an acrid poison. Formerly it was so highly esteemed as a medicine that the name of *Gratia Dei* (grace of God) was given to it, and for the same reason it is known in France as *herbe du pauvre homme* (poor man's herb). It is said to be the basis of the famous gout medicine called *eau médicinale. Gratiola peruviana,* a South American species, has somewhat similar properties. These properties are supposed to depend upon a bitter resinous principle called gratiolin. A number of species are common in the United States, but none appear to be of economic importance.

GRATRY, grȧ'trē', Auguste Joseph Alphonse (1805–72). A French Roman Catholic theologian, born at Lille. He was educated at the Ecole Polytechnique, became director of the Collège Stanislas, Paris, in 1842, and five years later almoner of the Superior Normal School. In 1852 with others he reconstituted the Oratory of the Immaculate Conception, a society devoted to the instruction of youth. He became vicar-general of Orléans in 1861, and professor of ethics in the Sorbonne two years later, and in 1867 was made a member of the Academy. Père Gratry was a warm friend of Père Hyacinthe, but did not share in the latter's extreme views on Church questions. During the Council of the Vatican he published four letters in opposition to the opportuneness of defining papal infallibility. These acts brought about his retirement from the Oratory in 1869, but when the dogma was promulgated he accepted it. His works are: *Cours de philosophic* (6 vols., 1855–57); *Les sophistes et la critique* (1864); *Jésus-Christ* (1864), addressed to Renan; and *La morale et la loi de l'histoire* (1868). Consult Perraud, *Le Père Gratry* (Paris, 1900), and Chauvain, *Life of Abbé Gratry* (ib., 1901).

GRATTAN, grăt′an, Henry (1746–1820). An Irish statesman and orator. He was baptized at Dublin, July 3, 1746. His father was recorder of Dublin and member of Parliament for that city until his death, in 1776. In 1763 Grattan entered Trinity College, Dublin, and four years later took his bachelor's degree, became a student at the Middle Temple in London, and in 1772 was admitted to the Irish bar. Politics, however, rather than the law, attracted Grattan, and in 1775 he was returned to the Irish Parliament as member for the borough of Charlemont. He became the leader of the popular cause, demanding free trade for Ireland; and when this had been obtained temporarily, he demanded that the laws made by the Irish Parliament should no longer be subject to the revision of the English Parliament. On April 19, 1780, he made his famous speech in favor of this measure, and two years later it was granted. He lost his popularity, however, when he opposed Flood's demand that a final renunciation of the principle of Irish dependence should be demanded, and only regained popular favor after he opposed Pitt's commercial measures. He spent thereafter many years urging the removal of all disabilities as regards Catholics, but was unsuccessful. When in 1797 Ulster was put under martial law, and Grattan's protests were unavailing, he withdrew from Parliament. He returned to Parliament in 1800 with the express purpose of opposing the proposed union between Great Britain and Ireland. His speeches were most eloquent, but they availed nothing. In 1805 he was persuaded to accept a seat in the Parliament in London, and labored there also for Catholic emancipation until his death, which occurred in London on June 6, 1820. Grattan's public and private character was unimpeachable, and as an orator he stands in the first rank, his style being rapid, and rich in antithesis and poetic suggestiveness. Consult: Henry Grattan (son), *The Speeches of the Right Honorable Henry Grattan in the Irish and in the Imperial Parliament* (4 vols., London, 1882); *Memorics of the Life and Times of Henry Grattan* (new ed., London, 1849); Dunlop, *Life of Henry Grattan* (Philadelphia, 1899); Zimmern, *Henry Grattan* (London, 1902); Lecky, *Leaders of Public Opinion in Ireland* (New York, 1903).

GRATTAN, Thomas Colley (1792–1864). An Irish author. He was born in Dublin, but lived mostly abroad. Because of his brilliant articles to the London *Times* from Brussels, he was appointed (1839) British Consul at Boston, Mass., where he remained until 1846. He took an important hand in the Ashburton Treaty (1842). His many romances in verse and prose met with considerable success; but he was mainly known by *Highways and Byways* (three series, 1823–29), an account of his travels, written at the suggestion of Washington Irving. His *Beaten Paths* (1862) is largely autobiographical.

GRAT′TIUS FALIS′CUS. A Roman poet, contemporary of Vergil, and author of a poem upon the chase entitled *Cynegetica.* Of the poem 541 hexameters have come down through one manuscript, discovered in France in the beginning of the sixteenth century. In 1654 it was translated into English verse by Christopher Wase. Consult Bährens's *Poetæ Latini Minores* (vol. i, Leipzig, 1879; vol. ii of the same work, as revised by Vollmer, ib., 1911); Curcio, *Poeti Latini Minori* (Acireale, 1902).

GRATZ. See Graz.

GRAU, grou, Maurice (1849–1907). An operatic manager, born in Brünn, Moravia, but a resident of the United States after 1854. He was educated in the schools of the city of New York, and afterward graduated from the College of the City of New York, then known as the Free Academy. He entered the service of his uncle, who was a well-known operatic and dramatic manager; and made his own first venture as an impresario by bringing Aimée to the United States in 1872. The following year he organized the Kellogg English Opera Company, and also instituted a series of dramatic performances, starring Salvini and acting as Rubinstein's manager. In 1891 the Maurice Grau Opera Company was formed and incorporated, and he became the manager of the Metropolitan Opera House, New York, which position he resigned in 1903. He was also appointed manager of the Royal Opera in Covent Garden, London, being succeeded, however, in 1901 by André Messager.

GRAU, Miguel (1834–79). A South American naval officer, born at Piura, Peru. He studied in the naval school at Callao, entered the Peruvian navy as midshipman in 1852, and was appointed to the command of the turret ship *Huascar* in 1871. Subsequently he was a deputy in the Peruvian Congress, and director of the Naval Academy. In 1879, upon the outbreak of the war with Chile, he entered active service as captain and was raised to the rank of rear admiral in recognition of his services. With the ironclads *Huascar* and *Indcpendencia* as the chief part of his fleet for a time he maintained a successful warfare against the Chilean navy. The loss of the *Independencia* by foundering in an attack on the blockading vessels at Iquique was a severe blow, but he still held the Chileans in check. Later, in the *Huascar,* he was attacked by two Chilean ironclads off Point Angamos, where the Peruvians made a heroic and desperate defense. He was killed by the explosion of a shell, and the *Huascar* was compelled to surrender. A memorial to Grau was erected by the nation at Lima.

GRAU, Rudolph Friedrich (1835–93). A German Lutheran theologian. He was born at Heringen-on-the-Werra, and was educated at Leipzig, Erlangen, and Marburg, where he became a member of the faculty in 1865. In 1866 he accepted a chair in the University of Königsberg. His numerous works, chiefly on race influence in religion, the importance of faith, and kindred subjects, include: *Semiten und Indogermanen in ihrer Beziehung zu Religion und Wissenschaft* (2d ed., 1867); *Bibelwerk für die Gemeinde* (with several other Lutheran clergymen, 2d ed., 1889); *Die Judenfrage und ihr Geheimnis* (1881); *Luthers Katechismus erklärt aus biblischer Theologie* (1891); *Zur In-*

spirationslehre und zum ersten Kapitel der Bibel (1892). Several of his works on faith, such as *Der Glaube die wahre Lebensphilosophie* (1881), were translated into English.

GRAUBÜNDEN, grou′bụn′den. The easternmost canton of Switzerland. See Grisons.

GRAUDENZ, grou′dents. A fortified town of Prussia, in the Province of West Prussia, situated on the right bank of the Vistula, 60 miles south of Danzig (Map: Germany, H 2). It is commanded by a citadel, erected in 1772–76 by Frederick the Great, and is surrounded by a wall. It is a well-built town with infantry, artillery, and cavalry barracks, a museum, a Gymnasium, two seminaries, and other educational and charitable institutions. The chief manufactures are machinery and other iron products, cigars, shoes, vehicles, lumber, flour, meal, and brushes. There is trade in wool and cattle. Pop., 1900, 32,727; 1910, 40,325. Graudenz, under the name of Grudenc, received municipal rights in 1291. It came into the possession of Poland in 1466, was occupied in 1655–59 by the Swedes, and annexed to Prussia in 1772. In the European War which broke out in 1914, Graudenz was the scene of some severe skirmishing and was seriously threatened by the first Russian advance, which almost rolled the entire German army east of the Vistula, upon Königsberg. Its fortifications were hastily strengthened, but it was only the transference of two army corps from the western battle line that saved it from capture.

GRAUL, groul, Karl (1814–64). A German missionary, born at Wörlitz near Dessau. After conducting the Lutheran mission at Dresden he went to India in 1849, where he studied the Tamil language, and devoted himself to missionary labor until 1853. His principal publications are: *Unterscheidungslehren der verschiedenen christlichen Bekenntnisse* (11th ed., 1884); *Bibliotheca Tamulica* (1854–65). He believed in the adaptation of Christianity to Oriental social conditions, and to this end urged the necessity of broad and liberal culture on the part of the missionary. Consult Richter, *History of Missions in India* (New York, 1908), for his mission work and principles.

GRAUN, groun, Karl Heinrich (1701–59). A German composer, born at Wahrenbrück, near Torgau, Prussian Saxony. When Frederick the Great came to the throne of Prussia he appointed Graun royal musical director, and commissioned him to organize an opera at Berlin, the singers for which were secured in Italy. For a long period the operas of Graun—about thirty in number—were performed at Berlin, to the exclusion of almost all others, excepting those of Hasse. Even more celebrated was the oratorio on the Passion, entitled *Der Tod Jesu*, which, until quite recently, was given annually in Berlin on Good Friday. Among his most noteworthy compositions are the following: *Ifigenia in Aulide* (1731); *Artaserse* (1743); *Semiramide* (1754); *Montezuma* (1755); the splendid *Te Deum* (1756); and numerous cantatas, motets, concertos, etc. Graun is represented as musical director upon the famous monument of Frederick the Great in Berlin. Consult C. Mennicke, *Hasse und die Brüder Graun als Symphoniker* (Leipzig, 1906).

GRAVE (AS. *græf*, *graf*, Goth. *graba*, OHG. *grab*, Ger. *Grab*, from AS. *grafan*, Goth., OHG. *graban*, Ger. *graben*, Eng. *grave*, to dig). The place where a dead body is interred. It is protected by the common law from violation by removing or disturbing the dead body, or stealing the coffin or grave clothes, such violation being punished as a misdemeanor, under the description of *grave robbing*, or *body snatching*. The common-law rule has been reënforced by statutory provisions in some States. See Cemetery Laws; Corpse; Burial; Mortuary Customs.

GRAVE (It., heavy). In music, an Italian term denoting a very slow tempo of serious character. It is employed very much like the largo (q.v.).

GRAVE, Caswell (1870–). An American pisciculturist. He was born at Monrovia, Ind., graduated from Earlham College, Richmond, Ind., in 1895, and studied at Johns Hopkins University (Ph.D., 1899), where he taught after 1901, becoming associate professor in 1906. He also served as an assistant on the United States Fish Commission in 1899–1900, as director of the United States Fisheries Laboratory, Beaufort, N. C., in 1902–06, and as shellfish commissioner of Maryland in 1906–12. After 1912 he directed the course in invertebrate zoölogy at the Marine Biological Laboratory, Woods Hole, Mass. He was secretary-treasurer of the American Society of Zoölogists in 1913, and is author of contributions on zoölogy. He is an authority on oyster culture and on the embryology of echinoderms.

GRAVE, The. A didactic poem of nearly 800 lines in blank verse, by Robert Blair. It was published in 1743 and in 1808. William Blake made a series of designs illustrating the poem, among his best and most successful work.

GRAVE′DIG′GER. A common name in India for the ratel or honey badger (see Badger), which has the reputation of digging into men's graves in order to feed on the corpses—a belief for which there is no justification in fact. Persians make the same accusation against their badger.

GRAV′EL. See Calculus.

GRAVEL (OF. *gravele*, *gravelle*, *grevelle*, from *grave*, *greve*, Fr. *grève*, sand; connected with Welsh *gro*, Corn. *grou*, MBret. *grouauenn*, sand; ultimately connected with Skt. *grāvan*, stone). The name given to aggregations of water-worn and rounded fragments of rocks, varying in size from a pea to a walnut. When the fragments are smaller the deposit is sand, when larger it is called shingle. Gravel deposits are formed by the action of running water, and are usually limited in size, occurring with more extensive strata of sand. They are found in the formations of every age. By infiltration of silica, lime, or iron oxides, the pebbles may be firmly cemented together, and form a hard rock called conglomerate (q.v.). Quartz, owing to its resistance to abrasion, is the most common mineral found as gravel. See Geology; Soil.

GRAVELINES, grȧv′lėn′ (Flem. *Gravelinghe*, Ger. *Gravelingen*, count's canal). A small fortified town of France, in the Department of Nord, on the Aa, 10 miles southwest of Dunkirk, and a mile from the North Sea (Map: France, N., H 1). It has an active shipping trade, builds ships, and manufactures beer, paper, and sugar. There are large cod and herring fisheries. Ships of 18-foot draft can use the harbor. Pop. (commune), 1901, 6202; 1911, 5898. The town was founded about 1160 by Theodoric of Flanders, and after 1405 was in possession of the house of Burgundy. It is noted as the scene of a victory gained July

13, 1558, by the Spanish troops under Count Egmont over the French under Marshal Thermes, a victory which compelled the French to accept the severe terms of the Treaty of Cateau Cambrésis (1559). In 1658 Gravelines was taken by Turenne, and was incorporated with France by the terms of the Treaty of the Pyrenees (1659).

GRAVELOTTE, gräv′lŏt′. A village in Lorraine, about 7 miles west of Metz, which has given its name to the most important battle of the Franco-German War, fought on Aug. 18, 1870, between the Germans under King William of Prussia and the French under Marshal Bazaine (Map: Germany, A 4). It was the third of the battles around Metz, following on Bazaine's attempt to retreat from the Moselle to Châlons and to effect a junction with the army of MacMahon. The battles of Colombey-Nouilly (August 14) and Mars-la-Tour (August 16) prevented the execution of this plan, and Bazaine, in fear of being cut off from Metz, fell back upon that fortress on August 17, taking up an exceptionally strong position on a ridge of hills to the west of the city, and fronting westward, with his line extending from Rancourt and Saint-Privat on the north through Amanvillers and Chatel to Rozerieulles. In German headquarters, where great uncertainty prevailed as to the exact position of the French, it was determined to attempt a flanking movement against the enemy's right, which was supposed to be at Amanvillers; at the same time the French left and centre were to be assailed to insure the success of the attack on their right. As it turned out, however, the French right extended some three miles to the north of Amanvillers, and the execution of the flanking movement was thus delayed. A premature attack on the French centre and left which was begun about noon at Vernéville was checked by a withering fire from the French, the irregular nature of the terrain making the advance of the German infantry exceedingly difficult. An ill-advised charge by the First Cavalry Division was repulsed and served only to throw the German right for a time into confusion; and though by nightfall the Germans had succeeded in carrying the heights of Moscou, Saint-Hubert, and Point-du-Jour, the fighting in that quarter attained no decisive point. The outcome of the battle was decided on the French right, where the flanking manœuvre of the Germans, though delayed, was finally carried out. Saint-Privat was carried by the Guards and Saxon troops at seven o'clock in the evening, and the French right was driven from its position with immense loss. In the night Bazaine fell back upon Metz, abandoning all hope of joining MacMahon. The German forces engaged, which consisted of the armies of Steinmetz and Prince Frederick Charles, and which were commanded by King William in person, numbered about 205,000 officers and men, and suffered a loss of more than 20,000 in killed and wounded. The French out of 130,000 engaged lost nearly 600 officers and more than 13,000 men. The battle is often known as the battle of Saint-Privat. Consult: F. E. H. Erb, *L'Artillerie dans les batailles de Metz, 14–18 août* (Paris, 1906); C. Bleibtreu, *Die Schlachten um Metz* (Metz, 1910).

GRAV′ELROOT′. A North American medicinal plant. See Eupatorium.

GRA′VENBERG, Wirnt von. See Wirnt von Gravenberg.

GRAVENHURST, grā′vẹn-hûrst. A town in Muskoka District, Ontario, Canada, situated at the foot of Muskoka Lake, and on the Grand Trunk Railway (Map: Ontario, E 4). It is a well-known summer resort, and two miles distant on the shore of Muskoka Bay are three sanitariums for consumptives. Its industrial establishments include lumber and saw mills, a foundry, and manufactories of soda water, steel chairs, cabinets, carriages, boats, interior fittings, and crushed stone. It possesses electric lighting, water works, and electric power. Pop., 1911, 1624.

GRAVENREUTH, grä′vẹn-roit, Karl, Baron (1858–91). A German traveler in Africa. He was born in Munich. He entered the army in 1877. In 1885 he founded the station of Korogwe in Usambara for the German East Africa Company. Afterward he took an active part in subjugating the Arab revolt at Bagamoyo, and in 1890 was appointed commander of an exploring expedition through southern Kamerun, where he met his death in an encounter with the natives. In recognition of his valor and of his valuable services to the government, a monument was erected to him at Kamerun.

GRAVER. See Burin.

GRAVES, Alfred Perceval (1846–). An Irish poet, born in Dublin, the son of the Bishop of Limerick. He was educated at Trinity College, Dublin, held important positions in the civil service, and was made inspector of schools in 1874. He contributed to the periodicals and did much for Irish song and music. Among his volumes are: *Songs of Killarney* (1872); *Irish Songs and Ballads* (1879); and subsequently *Songs of Irish Wit and Humour* (1884), with Dr. C. Wood; *The Irish Song Book* (1894); *Irish Folk Songs; Songs of Erin,* with Dr. C. V. Stanford; *Rhoscen Dhu,* a dramatic monologue; *The Postbag: A Lesson in Irish,* an operetta (1901); *The Absentee* (a play produced in 1908); *Welsh Poetry, Old and New, in English Verse* (1912).

GRAVES, Charles Larcom (1856–). An Irish author, son of the Bishop of Limerick. He was educated at Marlborough and at Christ Church, Oxford; wrote with E. V. Lucas several clever pamphlets (*Wisdom while you Wait, Signs of the Times,* etc.) satirizing the "American invasion" in English newspaper and publishing business; composed light verse and was a well-known musical critic; became assistant editor of the *Spectator* in 1899; and in 1902 was a recognized contributor to *Punch.* Among his books are biographies of Sir George Grove (1903) and Alexander Macmillan (1910); *The Blarney Ballads* (1893); *The Hawarden Horace* (1894); *The Diversions of a Music Lover* (1904); *Humors of the Fray* (1907); *Musical Monstrosities* (1909); *Party Portraits* (1910); *Post-Victorian Music* (1911), essays from the *Spectator; The Brain of the Nation* (1912).

GRAVES, John Temple (1856–). An American newspaper editor and publicist, born at Willington Church, Abbeville Co., S. C. He studied at the University of Georgia. He was editor of several Florida and Georgia papers before becoming editor in chief and coproprietor of the Atlanta *Daily Georgian* in 1905. In 1907 he was appointed editor in chief of the New York *American.* He was presidential elector from Florida in 1884 and from Georgia in 1888, and in 1908 was candidate of the National

Independence party for Vice President of the United States. Graves became known as one of the most progressive and patriotic leaders in the South and as an advocate of international peace. He published a *History of Florida To-Day, Speeches and Selections for Schools, The Negro*, and edited *Eloquent Sons of the South* (2 vols., 1909).

GRAVES, Richard (1715–1804). An English novelist, born in Gloucestershire. He graduated at Pembroke College, Oxford, in 1736, was elected a fellow of All Souls, and studied medicine in London. In 1749 he became rector of Claverton, near Bath, where he remained till his death. Of his verses and numerous sketches and novels, only one has survived, *The Spiritual Quixote* (1772), an amusing burlesque.

GRAVES, Robert James (1797–1853). An Irish physician, famous as a clinician, lecturer, and original investigator. His name, with that of Basedow (q.v.), is known to modern students of medicine in connection with exophthalmic goitre; but it was his work in the treatment of fevers, especially typhus, which was most important. He came of a Dublin family of divines and scholars and studied medicine at Trinity College. After a brilliant university career Graves pursued his medical studies in London, Berlin, Göttingen, Hamburg, and Copenhagen. Returning to Dublin in 1824, he established, with some others, the private medical school known as the Park Street School. At this time clinical or bedside teaching was practically unknown, students getting their knowledge from formal lectures and private study, and to Graves is due the credit of thoroughly incorporating the clinical method into elementary medical education. As early as 1819 he began his experiences with typhus fever, when he was sent by the government to take charge of an extensive district in the west of Ireland where the fever was raging. In the successive epidemics which visited the country from 1819 to 1848 he was actively engaged. He recognized the contagiousness of typhus and introduced a tonic and supportive treatment in place of the starvation and purging method which then obtained. His efforts had much to do with stamping out the disease in Ireland. In 1827 he was elected professor of the institutes of medicine to the King and Queen's College of Physicians. His contributions to scientific literature were many. He was one of the editors of the *Dublin Hospital Reports*, was associated with Sir Robert Kane in the editorship of the *Dublin Journal of Medical Science*, and wrote much for the *Transactions of the Royal Irish Academy* and the *Edinburgh Philosophical Journal*. His book, *Clinical Lectures on the Practice of Medicine* (1843), was used in every medical school in Europe.

GRAVES, Thomas, Lord (c.1725–1802). An English naval officer. He was present as a lieutenant at the action off Toulon (1744) and in 1755 was placed in command of the frigate *Sheerness*. By 1779 he had attained the rank of rear admiral and in 1780 was sent with six ships of the line to North America to reënforce Arbuthnot. He succeeded Arbuthnot in command July 2, 1781, was subsequently joined at New York by Sir Samuel Hood with 14 ships of the line from the West Indies, and on August 31, in command of the combined fleet, sailed from New York for the Chesapeake to prevent the union of the French squadron under De Barras, from Newport, with the fleet under De Grasse. But suffering more injury than he inflicted in an encounter with De Grasse on September 5, he offered no opposition to De Barras on his arrival a few days later, and on September 10 he went back to New York. On October 19, with 25 sail of the line and two ships of 50 guns, he left New York for the relief of Cornwallis. On the same day Cornwallis surrendered, and Graves, upon his arrival on the 24th, found himself unable to accomplish anything. He thereupon relinquished the command to Rear Admiral Robert Digby and went to Jamaica in the *London*. In 1782 he was ordered to the command of a squadron of nine vessels destined for England and largely consisting of the prizes obtained by Rodney in the battle with De Grasse off Dominica (April 12, 1782). Only two of the unseaworthy craft got to England. Graves became vice admiral in 1787 and admiral in 1794. During the war with France in 1793–1802 he distinguished himself in Lord Howe's naval victory of June 1, 1794.

GRAVESANDE, grä′v*e*-sän′d*e*, (Charles) Storm van 's (1841–). A Dutch etcher. His art was formed under the influence of Félicien Rops at Brussels. He is known chiefly as an etcher of marines, in which he attains the grandeur of style of the best modern Dutch marine painters. He has depicted the sea in all of its aspects, in storm and in calm. An exhibition of his works was held at Boston in 1887.

GRAVESANDE, Willem Jakob, or Storm van 'sGravesande (1688–1742). A Dutch mathematician and philosopher, born at Hertogenbosch and educated in law, physics, and mathematics at the University of Leyden. He was made a member of the Dutch Embassy in London, where he was influenced by Newton and other scientists. In 1717 he was appointed professor of mathematics and astronomy at the University of Leyden and in that capacity had much influence upon the development of natural science. He invented the first heliostat and was one of the first scientists to accept Newton's theory of gravitation. His principal productions include *Physices Elementa Mathematica Experimentis Confirmata sive Introductio ad Philosophiam Newtonianam* (3d ed., 1742) and *Philosophiæ Newtonianiæ Institutiones* (3d ed., 1742).

GRAVES'S DISEASE, or Exophthalmic Goitre. See Basedow's Disease.

GRAVESEND, grāvz′ĕnd. A market town, municipal borough, and river port in Kent, England, 22 miles below London, on the right bank of the Thames (Map: England, G 5). Its prosperity has always depended upon London, of which it is the boundary port, where pilots and revenue officers board vessels ascending the river, and where troops and passengers embark for long voyages. Its extensive fruit and vegetable gardens form an important supply of the London markets; it carries on an extensive trade in fish and in ships' supplies, has boat building, iron founding, brewing, and soap boiling. The town occupies a commanding position on the first rising ground after entering the river and extends for two miles along the water front, the older and lower portion with narrow streets and the upper and newer portion with handsome thoroughfares, squares, and terraces. Its salubrious air and beautiful scenery make it a favorite excursion and summer resort. Its public buildings are conspicuous and include Milton parish church, a late Decorated edifice of the time of Edward II, and the Gravesend parish church, reërected in 1731, which was the burial place of the celebrated Indian princess Pocahontas in 1616; it contains a memorial pulpit donated in 1904 by the State of Indiana, and two stained-glass windows, the gift of the ladies of Virginia. Among the educational establishments are the free grammar school (founded 1580), Parrock Hall Industrial School, Milton Mount Congregational School for Ministers' Daughters, science and art schools, and a free library. In its western suburbs are Rosherville Gardens, a famous resort of Londoners.

The *Domesday Book* mentions Gravesend as a hythe or landing place. A town soon grew up after the Conquest, and the hythe was the assembling place for early navigators, including Sebastian Cabot and Martin Frobisher. Here the London Lord Mayor, aldermen, and city companies received all eminent foreigners and conducted them up the river in stately procession. The privileges granted by Richard II and Henry IV were confirmed by Queen Elizabeth's charter of incorporation in 1573. The fortified Vaubanian earthworks, constructed in the reign of Charles II to reënforce Tilbury Fort, were strengthened at considerable expense. The municipal borough comprises the parishes of Gravesend and Milton. Pop., 1901, 27,200; 1911, 28,117.

GRAVEYARD. An inclosed area for the burial of the dead. The term is less pretentious than "cemetery" and generally designates something simpler, like a portion of a churchyard in city or country, or like a relatively small detached burying place in a rural district. "Churchyard" is often, and "burying ground" less frequently, used in place of "graveyard." See Cemetery.

GRAVIER, Charles. See Vergennes, Count de.

GRAVIER, grȧ′vyȧ′, Jacques (?–1708). A French missionary in Canada and Illinois. He continued the work of Marquette among the Indians for several years, but was constantly opposed by the medicine men. He was very successful, however, among the Kaskaskia Indians, many of whom he baptized. Dangerously wounded by a hostile native, he sailed for Europe in 1706, returned in 1708, only partially cured, and died at Mobile soon after. He wrote three works on the Indian missions and Louisiana affairs and compiled a grammar of the Illinois tongue.

GRAVIER DE VERGENNES, C. E. J. See Remusat, Countess de.

GRAVINA IN PUGLIA, grȧ-vē′nȧ ĕn po͞o′-lyȧ. An episcopal city on the Gravina, in the Province of Bari delle Puglie, Italy, 35 miles southwest of Bari, on the Gravina River (Map: Italy, F 4). It has a collegiate cathedral, an episcopal library, a hospital, and several asylums. It markets grain, vegetables, wool, cheese, wine, horses, mules, oxen, and sheep. The annual fair in April is important. It was a favorite hunting place of Emperor Frederick II, who built the castle. Pop. (commune), 1901, 18,685; 1911, 19,900.

GRAVING DOCKS. See Dock.

GRAV′ITA′TION (Fr. *gravitation*, from Fr. *graviter*, to gravitate, from Lat. *gravitas*, weight, from *gravis*, heavy). The idea that there is an action between the earth and its moon and the sun and its planets perfectly analogous to that between the earth and a falling body occurred to many astronomers and students of science previous to the announcement by Newton in 1687 of his famous law of universal gravitation; but it was reserved for Newton to give this law exact mathematical expression. All bodies, when raised into the air and left unsupported, fall to the earth. The force which causes them to do so is termed gravity and, universal experience shows, acts towards the earth's centre; more strictly it acts in a direction perpendicular to the surface of still water. But if a body, such as a stone, be projected obliquely into the air, it describes a curved path, and when it meets the earth in its descent, its direction is not towards the centre, but inclined to it at the angle of projection. (See Projectiles.) Observing this, and that the body, if not stopped by the earth's surface, would continue to move in a curve, it is easy to imagine that it might circulate round the earth's centre as the moon does round the earth. (See Central Forces.) Observing now the time of revolution of the moon, we can calculate the force with which it tends to leave the path (centrifugal force). This must be balanced by an equal attractive force, or we should lose the moon. But then the question arises, Is this attractive force the same as the force acting on bodies near the surface of the earth? The answer is that it is a force 3600 times less intense. If, then, gravity be the force which really holds the moon to its path, we must explain why it acts upon it so much more feebly than it would were it a body on the earth's surface. The explanation is given at once if we suppose gravity to be a force whose magnitude diminishes with increase of distance, and inversely as the squares of the distances at which it is exerted; for the distance of the moon from the earth's centre is about 60 times that of the earth's surface from its centre, and $3600 : 1 :: 60^2 : 1$. We infer that this explanation is correct from the fact that there is nothing inadmissible in such a diminution of force with increase of distance, and in the argument drawn from the necessity of otherwise supposing some other force than gravity to be employed in deflecting the moon, and the force of gravity to cease at some unknown level. On these views Newton is understood to have at first rested his law of universal gravitation: Every particle of matter in the universe attracts every other particle with a force directly proportional to the mass of the attracting particle, and inversely to the square of the distance between them. Newton, before conceiving the law, had explained the three great Keplerian laws of motion obtaining in the solar system by reference to an attractive force residing in the sun. These laws are: (1) that the planets revolve round the sun in ellipses, having the sun for a common focus; (2) that every planet moves in such a way that the line drawn from it to the sun sweeps over equal areas in equal times; (3) that the squares of the times occupied by the several planets in their revolutions in their elliptic orbits are proportional to the cubes of their mean distances from their common focus, the sun. From the law of equal areas Newton inferred that every planet is retained in its orbit by a force of attraction directed towards the centre of the sun; from the orbits being elliptical, he inferred that in each case this force varies in intensity according to the inverse square of the body's distance from the sun; while from the third law he inferred the homogeneity of the central force throughout the solar system.

It was then, after being familiar with the notion of terrestrial gravity and its action, through the researches of Galileo, Huygens, and Hooke, and with the notion of a central force acting inversely as the square of the distance through his explanations of the laws of Kepler, that he put to himself the question: Is not the force with which the moon is pulled to the earth the same with gravity?—a question answered affirmatively on the supposition of gravity, like the sun's attraction, being a force diminishing with increase of distance and according to the same law. The result was to bring the whole solar system within the range of the law of gravitation. The phenomena of double stars justify the extension and the statement of the law as we have given it to universal terms. It may be observed, in conclusion, that the Keplerian laws, which may be said to have been the basis of Newton's researches, are, owing to perturbations (q.v.) caused by the mutual action of the planets, etc., only approximately correct, and that these perturbations afford, when examined, a further proof of the truth and universality of the law of gravitation.

Newton's law has been shown to hold also for smaller bodies at less distances apart. Within the range of possible experimental accuracy the law has been verified for bodies whose distances apart are as small as 3 or 4 centimeters. Whether the same law holds for bodies as small as molecules, and at distances as small as molecular distances, or not, cannot be said. Stated mathematically, Newton's law is that the gravitation force between two particles of masses m_1 and m_2, separated by a distance r, is given by the formula

$$F = \frac{Gm_1m_2}{r^2},$$

where G is a constant expressing the fact that F is proportional to $\frac{m_1m_2}{2}$ and is called the "gravitation constant." The actual mechanical force between two bodies of known masses at a known distance apart has been measured by different observers, first by Cavendish in 1798. Thus G may be determined. It has been shown by Mackenzie and Poynting to be the same for crystalline as for isotropic bodies; and, so far as is known, it is independent of the intervening medium and a true constant of nature. In the C. G. S. system its value, as determined by Boys, is $0\,.\,000000066576$, or 6.6576×10^{-8}. The same law may be applied to a body falling towards the earth, viz.,

$$F = G\frac{m_1m_2}{r^2}.$$

In this case, if m_1 is the mass of the falling body, $F = m_1g$, where g is the acceleration of such a body, and nearly equals 980 on the C. G. S. system. It was shown by Newton, and later by Bessel, that the value of g is independent of the kind of matter which is falling, and it has been proved to be independent of the mass. g varies of course from point to point on the earth's surface, owing both to its rotation and to its spheroidal shape. Formulas have been calculated for g as a function of the geographical latitude Φ; one of the best is $g = 979.89\ (1 + 0.0052 \sin^2 \Phi)$. In the formula m_2 is the mass of the earth, and r is the radius of the earth if it is assumed that the gravitation action of the earth is the same as if it were all concentrated at the centre. (A homogeneous sphere, or one made up of homogeneous spherical shells, would have this action.) Therefore

$$m_1g = G\frac{m_1m_2}{r^2},$$

or

$$m_2 = \frac{gr^2}{G}.$$

If this G is the same as in the previous formula —an *assumption* for or against which there is no evidence—the three quantities on the right-hand side of the equation are known; and so m_2, the mass of the earth, may be determined. The average density of the earth, then, is this mass divided by the volume of the earth, which is approximately $\frac{4}{3}\pi r^3$. That is, calling Δ this density,

$$\Delta = \frac{3g}{4\pi rG}.$$

Assuming the above value for G, viz., $G = 6.6576 \times 10^{-8}$, this gives

$$\Delta = 5.5270.$$

For full details as to the law of gravitation, its history and its verification, reference should be made to *The Laws of Gravitation*, in "Scientific Memoir Series," ed. by Mackenzie, vol. ix (New York, 1900).

There have been several theories of gravitation, i.e., attempts to prove that it is a consequence of other properties of matter. One of these, known by the name of Le Sage, explains gravitation as due to the pressure upon the portions of matter produced by the impact of streams of minute particles traversing space in all directions. Naturally any one portion of matter will shield another neighboring portion from these streams, and so the two portions will be driven closer. The fundamental objection to this theory is that, owing to the impact of the stream of particles, there would be thermal phenomena, which are not observed.

A more recent theory has been proposed independently by several physicists—Lorentz, Thomson, Schuster, and others. It is based upon the fact that all atoms of matter contain positive and negative electric charges; and it assumes that the attractive force between unlike charges in two neighboring portions of matter is greater than the repulsive force between the like charges. This theory may be true. Consult Ames, *The Constitution of Matter* (Boston, 1913).

GRAV'ITY, CENTRE OF. See CENTRE OF GRAVITY.

GRAVITY, SPECIFIC. See SPECIFIC GRAVITY.

GRAY, ASA (1810–88). The foremost botanist of America during his period. He was born at Paris Furnace, N. Y., his father being a tanner. Although not college-trained, he had a literary style remarkable for its lucidity and elegance. He studied medicine in a physician's office and obtained the degree of M.D. in 1831. In New York City he formed the acquaintance of John Torrey, who finally secured for him in 1836 the position of curator of the New York Lyceum of Natural History. This began his career as a professional botanist. Through Torrey also he was appointed botanist to the government expedition to the southern Pacific under Captain Wilkes; but he gave up this project, tired of waiting for the expedition to sail, and joined Torrey as junior author of the proposed *Synoptical Flora of North America.* In 1836 Gray published his *Elements of Botany,* which was the first of his remarkable series of textbooks. In 1838 he received his first definite and congenial position as botanist, being appointed professor of natural history in the newly organized University of Michigan. However, a leave of absence, obtained so that he might visit European herbaria in connection with his work upon the North American flora, was prolonged, and he never entered upon his duties in Michigan. In 1842 he was appointed Fisher professor of natural history at Harvard University, where he afterward made his great reputation. Because of his work Cambridge became at that time the American centre of botanical instruction and investigation. In 1848 Gray issued the first edition of his *Manual,* which in 1914 was in its seventh edition. His contribution to American taxonomy consists, not only in the numerous monographs he prepared, but also in the organization of the chaotic mass of taxonomic work which preceded him; and he was, besides, one of the first plant geographers, his comparison of the flora of the eastern United States and Japan being a notable contribution to the subject. As the champion of Darwin in the United States, he presented the theory of natural selection and defended it as not contrary to religion. The collection of his very interesting discussions on the subject is entitled *Darwiniana* (New York, 1876). He was an exceedingly keen critic and for years was the medium through which American students kept in touch with European botany. His reviews in the *American Journal of Science* were always important sources of information to American botanists. From 1863 to 1873 he was president of the American Academy of Arts and Sciences and in 1871 was elected president of the American Association for the Advancement of Science. His philosophical papers have been collected and published in two volumes by Sargent, under the title *Scientific Papers of Asa Gray* (Boston, 1888); and a very interesting volume is his *Letters,* edited by Mrs. Gray (London, 1893).

GRAY, David (1838–61). A Scottish poet, born at Merkland, Kirkintilloch, Dumbartonshire. He had been educated for the ministry, but early became a contributor to the Glasgow *Citizen,* and the success of these beginnings made him decide to devote himself to literature. In 1860 he went to London, where he was kindly helped by Monckton Milnes, afterward Lord Houghton. But he could not get his poems printed, and the privations he suffered during those first weeks in London broke his health. He developed consumption and died soon after his return to Scotland. Meanwhile his idyllic poem, "The Luggie," had been accepted, and was published with some other verse in 1862, Milnes himself writing the preface. During the last year of his life Gray composed a series of sonnets called *In the Shadows.* Another edition of his poems was brought out in 1874, edited by H. G. Bell. For further biographical detail, consult the sketch by his friend Robert Buchanan, in *David Gray and Other Essays* (London, 1868).

GRAY, Elisha (1835–1901). An American inventor, born at Barnesville in Ohio. He attended Oberlin College, supporting himself by working at the trade of a carpenter. In 1867 he obtained his first patent, which was for telegraphic apparatus. Subsequently he received nearly 50 patents, relating principally to the telephone and other electrical apparatus. Claims were advanced in behalf of Gray as one of the inventors of the speaking telephone (q.v.), for which he filed specifications, Feb. 14, 1876; but the patent was awarded to Alexander Graham Bell (q.v.), whose rights were sustained by the Supreme Court. Among his other inventions were a system of multiplex telegraphy, a type-printing telegraph, the telautograph (q.v.), and numerous telegraphic and telephonic appliances and adjuncts. He was for a number of years engaged in the manufacture of telegraphic apparatus in Chicago and Cleveland. He was the author of *Experimental Researches in Electro-Harmonic Telegraphy and Telephony* (1878), a book based upon his experiments.

GRAY, George (1840–). An American jurist and legislator. He was born in New Castle, Del., graduated at Princeton in 1859, studied law at Harvard, was admitted to the bar in 1863, and practiced at New Castle and at Wilmington. He was Attorney-General of Delaware from 1879 to 1885, when he was elected to the United States Senate as a Democrat to succeed Thomas F. Bayard. He was reëlected in 1887 and in 1893. Strongly conservative in his political and economic views, he was as Senator a stanch supporter of President Cleveland in his policy of tariff reform and in his opposition to the "free silver" and other financial propaganda of the time. In 1898 he served as a member of the Anglo-American Joint High Commission and on the Paris Peace Commission. In 1899 he was appointed United States Circuit Court judge; in November, 1900, became a member of the international Committee of Arbitration; in 1902 served as chairman of the Anthracite Coal Strike Commission; and in 1910 was a member of the North Atlantic Coast Fisheries Arbitration of The Hague. He resigned his position as Circuit Judge of the United States in 1914.

GRAY, George Buchanan (1865–). An English Old Testament scholar, born in Blandford, Dorset, where his father was an Independent minister. Educated at New and University colleges, London, at Mansfield College, Oxford, and at the University of Marburg, he entered the Independent ministry in 1893, and in 1900 (having been tutor since 1891) became professor of Hebrew and Old Testament exegesis at Mansfield College. He received an honorary D.D. from Aberdeen, and wrote, besides contributions to the *Encyclopædia Biblica* and to periodicals, *Studies in Hebrew Proper Names* (1896); *The Divine Discipline of Israel* (1900); editions of *Numbers* in the "Temple Bible" (1902) and the "International Critical Commentary" (1903) and of the early chapters of *Isaiah* in the latter series (1912), and *A Critical Introduction to the Old Testament* (1913).

GRAY, George Robert (1808–72). An English zoölogist, brother of J. E. Gray (q.v.), born at Chelsea and educated at Merchant Taylors' School. In 1831 he was appointed assistant in the zoölogical department of the British Museum. His works, which reveal much patient research, include: *Entomology of Australia* (1833); *Hand-List of the Genera and Species of Birds,* containing about 11,000 species (1869–

72); *Genera of Birds* (3 vols., illustrated, 1844–49), a very useful and valuable work. Gray also contributed on entomology to the works of Cuvier and Agassiz.

GRAY, Henry Peters (1819–77). An American genre, historical, and portrait painter. He was born in New York, and after preliminary studies with Daniel Huntington (q.v.), he studied five years in Italy. He was elected a member of the National Academy in 1842, and during the following year executed a number of genre and historical paintings. In 1846 he revisited Europe, staying a short time, and returned again in 1871, when he spent three years in Florence. Between these two visits he was elected president of the National Academy, holding the office from 1869 to 1871. The subjects of many of his paintings are taken from antiquity, and his art shows no particular American characteristic, but rather the influence of Italian, especially of Venetian, masters. The latter portion of his life was devoted chiefly to painting portraits, of which he executed some 250, smooth in finish, mellow in color. The following list includes some of his more important works: "Immortality of the Soul"; "Greek Lovers" and "Wages and War," Metropolitan Museum, New York; "Birth of our Flag" (1875); "Apple of Discord" (1876); portrait of William Cullen Bryant, Historical Society, New York; "Cupid Begging his Arrow," Pennsylvania Academy, Philadelphia; "Cleopatra Dissolving the Pearl," Metropolitan Museum; "Judgment of Paris," Corcoran Gallery, Washington; "Ophelia"; "Normandy Girl"; "Jessica, the Pride of the Rialto"; "Blessed Are the Pure in Heart"; "St. Christopher"; "Hagar and the Angel"; "Portia and Bassanio."

GRAY, Horace (1828–1902). An American jurist, born in Boston, Mass. He graduated at Harvard College in 1845 and at the Harvard Law School in 1849. After practicing law in Boston he became in 1854 reporter to the Massachusetts Supreme Court, in which position he remained until 1861, compiling and publishing 16 volumes of *Reports.* From 1864 to 1873 he was an associate justice of the same court and was Chief Justice from 1873 to 1882. In the latter year he was appointed by President Arthur an associate justice of the Supreme Court of the United States, to succeed Justice Clifford, and served until shortly before his death. A lawyer of profound and varied learning, as well as of great natural ability, he exercised an important influence on the decisions of the Supreme Court in the important period of constitutional development in which he served. Consult Francis C. Lowell's "Horace Gray," in the *Proceedings of the American Academy,* vol. xxxix (Boston, 1904).

GRAY, John Edward (1800–75). An English naturalist. He was born at Walsall and was educated for the medical profession, and in 1821 he assisted his father in the preparation of his *Natural Arrangement of British Plants.* In 1824 he entered the British Museum as assistant in the natural history department and in 1840 was appointed keeper of the zoölogical collections. This important post he retained till his death, and the British Museum collections are a monument of his persevering activity. The titles of his books and papers number more than 500. His "Catalogues" are not mere lists, but are enriched with synonyms and ample notes, whereby study of particular subjects is greatly promoted. Gray also assisted in the formation of some of the most prosperous scientific societies of London. He was a vice president of the Zoölogical Society, assisted in the management of the British Museum, and served on the juries of the international exhibitions of 1851 and 1862.

Gray's principal works are: *Illustrations of Indian Zoölogy* (2 vols., 1832–34); *The Knowsley Menagerie* (2 vols., 1846); *Spicilegia Zoölogica* (1828–40); a *Synopsis of the Contents of the British Museum* (1866); *Genera of Birds* (1849); and *Catalogues* of various departments in the British Museum.

GRAY, John Hamilton (1814–89). A Canadian statesman and jurist. Born at St. George's, Bermuda, in youth he removed to New Brunswick, where he studied law and was called to the bar. He was elected a member of the New Brunswick Legislature in 1850. In 1856 he left the Liberal party and in 1856–57 was Conservative leader and Premier of the province. In 1860 he was appointed to represent the Imperial government on a commission to settle the difficult land question of Prince Edward Island (q.v.). Gray bore a distinguished part in the initial movement towards Canadian confederation. In 1864 he was one of the representatives of New Brunswick at a conference in Charlottetown, Prince Edward Island, to arrange a federal union between the three maritime provinces. Ultimately the conference was enlarged so as to include representatives of Canada and met at Quebec in October of the same year. After confederation Gray was elected in 1867 to the House of Commons for St. John's Co., New Brunswick, retaining his seat until 1872. In the latter year he was appointed a puisne judge of the Supreme Court of British Columbia, which position he filled until his death. In 1884 he was a member of the Royal Commission on Chinese Immigration. He published *Confederation: A History* (1871).

GRAY, John Henry (1859–). An American economist, born at Charleston, Ill. He studied at the Illinois State Normal University, graduated from Harvard University in 1887 and (Ph.D.) from the University of Halle in 1892, and studied also at Paris, Vienna, and Berlin. In 1887–89 he taught political economy at Harvard, from 1892 to 1907 was professor of political and social science at Northwestern University, and was then called to the University of Minnesota, where he became head of the department of economics in 1913. He was an expert in 1902–03 of the United States Bureau of Labor to investigate restriction of output in Great Britain, and in 1911–14 directed investigations into the regulation of public-service corporations, for the National Civic Federation. He was president of the American Economic Association in 1913–14. He published: *Die Stellung der privaten Beleuchtungsgesellschaften zu Stadt und Staat; Die Erfahrung in Wien, Paris, und Massachusetts* (1893); *Regulation and Restriction of Output in Great Britain* (1903); *Commission Regulation* (1913).

GRAY, John Purdue (1825–86). A distinguished American alienist, born in Pennsylvania. He graduated at Dickinson College in 1846, studied medicine, and received his medical degree from the University of Pennsylvania in 1848. He was assistant physician at the New York State Insane Asylum at Utica from 1851 to 1853, medical superintendent of the Michigan

State Asylum at Kalamazoo from 1853 to 1854, and medical superintendent of the Utica State Asylum, N. Y., from 1854 to 1886. He was instrumental in securing many improvements in the treatment of the insane and introduced the use of the microscope in study of brain tissue at the asylums. He edited the *American Journal of Insanity* from 1854 for many years and was prominent in many public charities, such as orphanages, hospitals, and societies for the relief of the destitute. He published several articles and addresses. Shot by a lunatic in 1882, he never recovered from the effects of the attack.

GRAY, Louis Herbert (1875–). An American Orientalist, born at Newark, N. J. He graduated in 1896 from Princeton University, where, after receiving the degree of Ph.D. from Columbia in 1900, he was chief cataloguer and instructor in Indo-Iranian (1900–02). He served as American collaborator on the *Orientalische Bibliographie* in 1900–06, revised translations for *The Jewish Encyclopædia* in 1904–05, was associate editor of Hastings's *Encyclopædia of Religion and Ethics* after 1905, and also edited the department of etymology and the modern history of India for the New International Encyclopædia. He published *Indo-Iranian Phonology* (1902) and *The Hundred Songs of Kamal ad-Din of Isfahan,* with Ethel Watts Mumford (1904), translated Subandhu's *Vasavadatta* (1913), and is engaged in preparing the *Etymologisches Wörterbuch der altindischen Sprache.*

GRAY, Maxwell (pen name of Mary G. Tuttiett). An English novelist, born at Newport, Isle of Wight. She became known by *The Silence of Dean Maitland* (1886). Among her other popular novels are: *In the Heart of the Storm* (1891); *The Last Sentence* (1893); *A Costly Freak* (1893); *House of Hidden Treasure* (1898); *The World's Mercy* (1900); *Four-Leaved Clover* (1901); *The Great Refusal* (1906); *Unconfessed* (1911), a volume of miscellanies, including poems; and *The Desire of the Moth* (1912).

GRAY, Robert (1757–1806). An American sailor and discoverer, born at Tiverton, R. I. He served as an officer in the American navy during the Revolution and at the close of the war entered the merchant marine. On Sept. 30, 1787, he sailed from Boston as master of the sloop *Washington,* and under the command of Capt. John Kendrick, of the ship *Columbia,* bound on a trading voyage to the northwest coast of America and to China. Soon after doubling Cape Horn the vessels ran into a violent storm which separated them. Thence he returned home by way of the Cape of Good Hope (1790), the first to carry the American flag around the globe. According to Gen. A. W. Greely, Gray actually entered the Columbia River in August, 1788, during this voyage; but however that may be, he did enter it on May 11, 1792, during a second voyage, and the river was thereafter called in honor of his vessel. It was largely on this discovery that the United States based its claim to the Oregon country. Consult Greely, *Explorers and Travelers* (New York, 1893), and Laut, *Vikings of the Pacific* (ib., 1905).

GRAY, Stephen (?–1736). An English electrician. He is described as a pensioner of the Charterhouse, but biographical details are extremely meagre. His researches often went far afield, but he is credited with several interesting discoveries. He first divided substances into electrics and nonelectrics, in accordance with whether they were or were not found to respond to frictional electricity. The division into conductors and nonconductors is also his, and he demonstrated that nonelectrics could be made electrics by contact with active electrics. He evolved the principles of the communication of electric power from native electrics to other bodies; discovered that electric conductivity depends on material, not on color or any similar quality, and noted the possibility of the insulation of conductors by cakes of resin. He first showed that the human body was a conductor. His investigations aided Charles du Fay in France and contributed to the invention of the Leyden jar by Musschenbroek. Gray was elected a fellow of the Royal Society in 1732.

GRAY, Thomas (1716–71). An English poet, born in Cornhill, London, Dec. 26, 1716. His father, Philip Gray, a money scrivener, was of a disposition so violent that his wife was obliged for a time to separate from him, and it was mainly through her exertions that the boy was educated at school and college. In 1727 he was sent to Eton, where he formed a close friendship with Horace Walpole, son of the Prime Minister. In 1734 he entered Peterhouse, Cambridge. He disliked the mathematics and philosophy of the curriculum and left without a degree. In 1739 he went abroad, in company with Horace Walpole. They spent more than two years in France and in Italy, visiting places of interest and exploring picture galleries. The two friends quarreled, and Gray returned alone (September, 1741). Three years later the breach was healed. In the meantime Gray's father had died (1741), and his mother had settled at Stoke Poges. To please her, Gray returned to Peterhouse, where he took the degree LL.B. in 1743. Little interested in law, he settled down for six years to a severe study of Greek literature. Henceforth Cambridge was his home, though he spent two years (1759–61) in London, reading in the British Museum. In 1756 he changed his residence from Peterhouse to Pembroke. His holidays he passed with his mother at Stoke Poges, with Walpole at Strawberry Hill, and with other friends. His mother, to whom he was tenderly attached, died in 1753 and was buried at Stoke Poges. In 1757 he received the offer of the laureateship, but declined. Feeling strongly the romantic impulse, he began about 1760 to be interested in early English poetry and then in Celtic and Norse literature. In 1768 he was appointed professor of history and modern languages at Cambridge at a salary of £371, but he never lectured. During his later life he made several tours, the most notable being to Glamis Castle (1765) and to the English Lakes (1769). He died at Cambridge, July 30, 1771, and was buried at Stoke Poges.

Gray was a shy man, given to melancholy; he formed few but close friendships. Having inherited from his father a small fortune, he was able to devote his life to study. He has the reputation of being, after Milton, the most learned of English poets. He wrote but little, yet some of these few poems are of perfect finish. His first English poem to be published was the "Ode on a Distant Prospect of Eton College" (1747), followed the next year by "Ode to Spring" and "On the Death of a Favourite Cat." "The Elegy Written in a Country Churchyard," begun in 1742, finished at Stoke Poges in 1750, was published in 1751. This poem, which has touched the popular heart, is one of the most perfect in our literature. It was followed in 1758 by the great Pindaric odes, "The Progress of Poesy" and "The Bard." In 1768 he published the first collected edition of his poems, among which were the romantic pieces, "The Fatal Sisters" and "The Descent of Odin." He also wrote good Latin verse. Consult: Gosse, *Thomas Gray*, "English Men of Letters Series" (London, 1882); Arnold's essay on Gray in Ward, *English Poets*, vol. iii (ib., 1880–83); *The Works of Thomas Gray in Prose and Verse*, ed. by Gosse (ib., 1882); Tovey, *Letters of Gray*, "Bohn's Library" (ib., 1900).

GRAY'BACK'. A sportsman's name for certain sandpipers, more especially the knot (q.v.).

GRAY DUCK. A local name of the gadwall.

GRAY'LING. A fish which in external appearance and habits resembles closely a small salmon, but differs sufficiently in structural character to justify its separation as of a distinct family, Thymallidæ. The only genus, including about five species, is *Thymallus*. They can readily be distinguished from the Salmonidæ by their more slender build, larger scales, and much larger dorsal fin, and in Europe may reach a weight of 4 or 5 pounds; but American specimens rarely exceed 1½ pounds. They are inhabitants of the streams of Arctic or cold regions and are graceful, active fishes. Their habits are much like those of the trout, but they are considered by many sportsmen superior to the trout as game fish as well as for the table.

The common European grayling (*Thymallus thymallus*) is very highly prized both for game and for food. It is found in Scandinavia and southward to Switzerland and Hungary; what is probably the same species also inhabits northern Russia and Siberia. It is common in the Orkney Islands and scattered about England, but is not known in Scotland or Ireland and is believed to have been introduced into England, where very long ago it was called "umber." Efforts have been made by fish culturists to propagate the English grayling and introduce it into new streams; but they have been unsuccessful, and similar efforts with American species have also failed. These fish spawn much after the manner of trout, but in early summer instead of in the autumn, and they are more prolific.

American Graylings. Two species of grayling are known in North America. One, the Arctic (*Thymallus signifer*), called "poisson bleu" by the Canadian fur hunters, inhabits clear streams from the Mackenzie River westward through Alaska. It is distinguished by its large size (18 inches), the great height of the dorsal fin, comparatively dull hues, and the five or six deep-blue spots on the forward part of the belly. The other species is the Michigan grayling (*Thymallus tricolor*), of which an isolated variety (*montana*) inhabits the head streams of the Missouri. Its existence was not known until about 1873, when it was discovered almost simultaneously in Michigan and Montana; and the sportsmen's journals of that and the following few years, especially *Forest and Stream*, of New York, contained a great deal about it. In distribution it is limited to the Au Sable and a few similar streams in northern Michigan, where it was formerly locally abundant, but is rapidly nearing extermination, by reason of the introduction there by the State authorities of brown trout (see Trout), which voraciously destroy the graylings. Ichthyologists assert that this species and its Western variety represent detached colonies left from the former or postglacial extension of the range of the Arctic grayling, of which this was once a variety. Graylings are caught by the same tackle and methods of fly fishing as are used for brook trout and are in high esteem with both anglers and epicures. Consult Prith, *The Book of the Grayling* (London, 1888). See Trout, and Plate of Trout.

GRAY PIKE. 1. A local name of the sauger (q.v.), and (2) of the common Eastern pickerel; also "green pike."

GRAY'S INN. One of the four great inns of court, or guilds of lawyers, in England. The society of Gray's Inn was instituted about the beginning of the sixteenth century. It had associated with it two inns of Chancery, Barnard's Inn and Staple Inn. See Inns of Court.

GRAY SNAKE. A dangerous elapine snake of Australia, of the genus *Diamenia*. Several species are found in large numbers. The most common (*Diamenia reticulata*) is 2 or 3 feet long, uniform gray above and greenish below, with a black and a yellow circle around each eye. This species frequents sandy regions, and its bite is of little account; but some of its larger congeners are deadly.

GRAY SNAPPER. A fish. See Snapper.

GRAY'SON, William (?–1790). An American Revolutionary soldier, born in Prince William Co., Va. He was educated in England, graduating at Oxford, and studying law at the Inner Temple, after which he returned to America and began the practice of his profession in Dumfries, Md. He ardently espoused the cause of the Colonies, was an active worker in the pre-Revolutionary movement, and in August, 1776, was appointed an aid-de-camp on the staff of Washington. In the following year he became colonel of a Virginia regiment, which he commanded with distinction at the battle of Monmouth. He acted, at Washington's appointment, as a commissioner to treat with General Howe concerning the exchange of prisoners and in 1780–81 was a member of the board of war. After the fall of Yorktown he settled in Virginia and resumed the practice of law, soon winning distinction through his scholarship and oratorical powers. He was a member of the Continental Congress from 1784 to 1787. In 1788 he was a delegate to the convention called in Virginia to consider the new Federal Constitution and with Patrick Henry led the opposition to its ratification. In 1789 he was chosen one of the senators from Virginia in the first national Congress, but died in the following year.

GRAY'S PEAK. One of the highest peaks in the Front Range of the Rocky Mountains in Colorado, near the border of Summit County, 12 miles southwest of Georgetown. It is 14,341 feet high, and was named in honor of Dr. Asa Gray, the botanist.

GRAY'S THUR'ROCK, or Grays. A town in Essex, England, on the Thames, 9½ miles southeast of Romford. It has a large trade in building materials. The *Shaftesbury* and *Exmouth*, industrial training ships of the London County Council, are anchored here. Pop., 1891, 12,400; 1911, 15,998.

GRAY TROUT. A Southern local name for the squeteague (q.v.); also "shad trout" and "sun trout."

GRAYWACKE, grā′wăk (*gray* + Ger. *Wacke*, projecting rock). A name applied to certain fragmental rocks, usually gray in color, which are cemented by an argillaceous or siliceous paste. The fragmental materials may include quartz, feldspar, slate, and other materials and rocks. The name is falling into disuse, as modern petrographers prefer to classify the varieties of graywacke with slates, sandstones, schists, etc., according to the structure and composition.

GRAY WHALE. A migratory whale (*Rhachianectes glaucus*) of the north Pacific. It is one of the rorquals (Balænopteridæ), is 35 to 40 feet long, mottled gray to blackish in color, and yields about 23 barrels of oil. The baleen is short, light-colored, and of little value. These whales spend the summer in Bering Sea and northward, and in the autumn return southward, where the females enter the bays of southern California to produce their young. It is during this autumnal migration that the whalemen go after them from shore stations. Formerly the animals passed close alongshore in great herds; but soon after this style of fishing began they learned to keep far out from land. Grayback, hardhead, and mussel digger are other local names, the last in reference to the animal's diving and coming up with mud on its lips. It is one of the fiercest fighters, and the hardest to kill, of all whales. A summary of our knowledge of this cetacean may be found in the illustrated monograph by Andrews on the "California Gray Whale," *Memoirs of American Museum of Natural History* (New York, 1914). See Plate of Whales.

GRAZ, or **GRATZ**, gräts. The capital of the Austrian Crownland of Styria, picturesquely situated in a beautiful region, on both sides of the Mur, about 140 miles southwest of Vienna by rail (Map: Austria-Hungary, D 3). The inner town, on the left bank of the river, connected with the town on the right bank by seven bridges, is built around the Schlossberg, formerly a strongly fortified hill, and since the destruction of the fortifications by the French in 1809 laid out in charming pleasure grounds. The view is famous from the Schlossberg, which is ascended by a cable railway. The city park is located on this hill and is a noteworthy example of the English style. The old bastions of the city have nearly disappeared. Among the more notable buildings are the Gothic cathedral, completed in 1462, and interesting on account of its fine stained-glass windows, altarpieces, and reliquaries (the adjoining mausoleum with an ornate façade contains the tomb of Emperor Ferdinand II); the parish church (1520), in late Gothic, with a fine altarpiece by Tintoretto; an early Gothic church of the Teutonic Knights, dating from the thirteenth century; the splendid Renaissance Landhaus, or Hall of the Estates, the place of assembly of the Styrian Diet, dating from 1569; the arsenal (1644), with a large and excellent collection of ancient weapons, and the Imperial castle, built in the eleventh century. Among the more modern buildings are the German Renaissance Rathaus, the university buildings, the law courts, the museum, and the Joanneum (founded 1811), with an important natural-history collection and other collections, and a library of 188,567 works. There should also be mentioned the Herz Jesu-Kirche, in early Gothic, finished in 1891, with a 360-foot tower. There are noteworthy monuments to Francis I and Archduke John.

Graz is well supplied with educational institutions, having in addition to the university (see Graz, University of) a technical high school (over 700 students in the winter semester), several Gymnasia, and industrial and trade schools. The provincial picture gallery includes examples of Tintoretto and Cranach. The charitable institutions are numerous and well equipped, and there are several art and scientific associations. Graz has important and rapidly growing manufactures of steel and iron products (especially steel rails), leather, paper, woolen cloths, hats, perfumery, etc. There are extensive railway shops, an important publishing company, and large savings banks. Owing to its position on the direct railway line between Vienna and Triest, Graz is favorably situated as an intermediary station for the trade between the Austrian capital and the Adriatic provinces. It is the seat of the superior courts for Styria, Carinthia, and Carniola, and of the Prince-Bishop of Seckau. The environs are delightful, offering fine views and interesting excursions. In population Graz is the sixth city of Austria, being exceeded, in order, by Cracow, Lemberg, Prague, Triest, and Vienna. Pop., 1890, 112,069; 1900, 138,080; 1910 (census of December 31), 151,781. Of the latter number, 14,200 were foreigners; of the remainder, the vernacular of 135,905 was German. Of the total population, 140,924 were returned as Roman Catholic, 6464 as Augsburg Evangelical, and 1971 as Jewish.

Graz is known to have existed in the ninth century, and it possibly occupies a Roman site. In the fifteenth century it was an Imperial residence and later became a strong centre of resistance to Turkish conquest. It was occupied by the French in 1797, 1805, and 1809. Since 1860 it has developed rapidly. Consult Gsell Fels, *Graz und seine Umgebung* (3d ed., Munich, 1898), and Gründorf, *Grazer Tourist* (2d ed., Graz, 1903).

GRAZ, University of. A university of Styria, Austria-Hungary, founded as a Jesuit college in 1573. After a somewhat checkered career, culminating in the eighteenth century, it was reorganized in 1826, 1849, and 1863, and was, in 1913, the fourth in importance among Austrian universities. It comprises faculties in theology, law, medicine, and philosophy. Its library is especially rich. The number of students in 1913 was 2151. Consult A. Schauenstein, *Die ersten 3 Jahrhunderte der K. F. Universität in Graz* (Graz, 1895).

GRAZIE, grä′tsĭ-å, Marie Eugenie delle (1864–). An Austrian dramatist and poet, born in Weisskirchen, Hungary, the daughter of an Italian mining engineer. She was educated in Vienna, traveled in Italy, and began to write when she was only 17. Her dramas were acted with some success: *Schlagende Wetter* (1899; 3d ed., 1905), in the Vienna German Volkstheater; *Saul* (1855), a tragedy; *Der Schatten* (1901; 2d ed., 1902); *Zu spät* (1903), in the Hofburgtheater, Vienna, and at Karlsruhe, Berlin, and St. Petersburg. Her collected works were published in 1903. She wrote: *Gedichte* (1882; 5th ed., 1903); the epics *Hermann* (1883; 3d ed., 1904) and *Robespierre* (1894; 3d ed., 1905), in theme and manner resembling Hamerling; *Italische Vignetten* (1892; 2d ed., 1903), another collection of poems; a satire called *Moralische Walpurgisnacht* (1896); a novel *Liebe* (1902; 2d ed., 1903); and the romances *Heilige und Menschen* (2d ed., 1910) and *Vor dem Sturm* (1910).

GRAZZINI, grȧ-tsē′nē̇, Antȯ′nio Francesco (1503–84). An Italian author, born at Florence and by vocation an apothecary. He was one of the founders of the Accademia degli Umidi, later Fiorentina (1540), and took the name of Il Lasca (the barbel), by which he was always known. Owing to a quarrel, Grazzini was excluded from the academy. In 1550 he was the main organizer of the Accademia della Crusca, which had for its object the purifying of the Italian language. He wrote a number of comedies, such as *La gelosia* (1568) and *La spiritata* (1561), verses, usually celebrating quarrels between himself and his academic brethren, and stories in the manner of Boccaccio. The stories, part of them published as *Le Cene* (1756), are models of prose, and vivid pictures of the Florentine life of his time. A selection from Grazzini's works was made by Fanfani, under the title *Le Cene ed altre prose* (1857) and *Commedie* (1859). Consult Gentile Curti, *Delle commedie di Grazzini* (Pisa, 1869), and Dini Olinto, *Il Lasca tra gli accademici* (ib., 1896).

GREASE (OF. *gresse, graisse,* Fr. *graisse,* fem. of *gras,* fat, from Lat. *crassus,* thick). A term formerly applied to mixtures of the three common glycerides—olein, palmitin, and stearin—in such proportions that the result possessed a semisolid or buttery consistency. Since the advent of petroleum the term has also been applied to the softer mixtures of the hydrocarbons derived from this source and used largely as lubricants. Greases from animal and plant sources have long enjoyed deserved popularity as foods, especially among peoples living in the temperate zones. The use of greases in culinary practice is almost as old as the human race. Frying, shortening of pastry, and special food-preserving methods practiced in sausage making, etc., are examples of common application. For any and all of the forementioned purposes the grease must be absolutely pure, sweet (not rancid), indicating the absence of anything but traces of free fatty acid, and of agreeable taste and odor. Such products are known as "edible fats" and are familiar to all as butter, butterine, lard, cottolene, crisco, etc. Greases have also been used for a long time as cosmetics, notably the fatty mixture furnished by the cocoa bean and known as "cocoa butter," and even mixtures of hydrocarbons entitled vaseline, which are very valuable and more reliable for these purposes. An old and well-established practice for extracting delicate perfumes from flowers consists in bedding the perfect blossoms in pure fresh grease. After a lapse of several months the greasy mass is gently heated, strained, and cooled. Such a product is known as pomade. From it the perfume material can be largely removed by pure alcohol and used in compounding perfumes. The greasy residue, still retaining slight traces of the original odor, is much used as a hair dressing.

When used as lubricants for heavy machinery or the axles of moving vehicles, the material may be of mixed composition. Pure greases of animal origin are now rarely employed. Hydrocarbon mixtures of high melting point, either alone or incorporated with soap and even rosin oil in some cases, are much used at the present time with the object of increasing the tensile strength of the product. They have the advantages of cheapness and chemical stability over animal and vegetable fats. With extended use of the automobile we find a demand for stiff hydrocarbon greases mixed with various grades of purified graphite. Pure hydrocarbon mixtures are frequently sold under the name "nonfluid oils." The most impure forms of grease are largely used to-day in the fabrication of the cheapest forms of soap and soap powders. Trade names by which these products are sold denote their origin—"swill grease," "bone grease," "glue grease," etc. The process by which grease is extracted from the fatty products of animals in the great slaughterhouses is described under Digester. Grease is also reclaimed from garbage. See Garbage and Refuse Disposal.

GREASE MOTH. A pyralid moth (*Aglossa pinguinalis*), with the fore wings grayish brown, clouded with a darker hue, and covered by two indented lines. The dark-hued larva feeds on greasy clothing, etc. Another species of *Aglossa* damages leather-bound books.

GREASE′WOOD′ (*Sarcobatus maximiliana*). A plant belonging to the family Chenopodiaceæ, which grows profusely in the western United States, especially on barren and alkaline soils, from the upper Missouri River region to Mexico and west to the Sierra Nevada Mountains. It reaches a height of from 4 to 8 feet. Cattle and sheep eat its leaves and browse off the smaller stems. The plant roots deeply and brings to the surface considerable quantities of alkali. (See Alkali Soils.) The name is sometimes applied in the West to species of *Gutierrezia*—plants which belong to the family Compositæ. See Plate of Desert Plants.

GREAT AMERICAN DESERT. This designation for the arid parts of the West, once familiar by its inscription on the maps, has practically dropped out of use except in historical reference. To the early explorer and gold seeker it had a real significance, but with the progress of railroad construction, the development of the abundant mineral resources, and the foundation of permanent agricultural communities in many localities by irrigation of the waste lands, the region as a whole has lost much of the character of a desolate wilderness. There are, however, important stretches of absolute desert, as destitute of water and vegetation as any of the Sahara, and great areas that never can be reclaimed. For variety and ruggedness of topography the region is without parallel elsewhere on the continent; the surface features include alkali plains, extensive lava flows, tracts of shifting sands, mesas, lofty plateaus, mountain barriers, and impassable cañons, with some of the most remarkable scenery in the whole world. It is also notable for some of the very hottest and driest places that are known, yet the climate nearly everywhere is healthful and in many parts enjoyable.

The boundaries of the Great American Desert can be indicated only in a very general way. The outer limits are the Rockies and the continuing ranges in New Mexico and Texas on the east and the Sierra Nevadas and Cascade ranges on the west. It thus includes a country over 700 miles across in the broadest part, and it extends from British Columbia on the north to the Mexican frontier, where it continues southward so as to cover a large section of that country. Only a part of the area described consists of real arid wastes; these are estimated to cover about 550,000 square miles within the United States and a somewhat smaller surface in Mexico. The remainder of the region is divided between mountains and plateaus, partly forest covered, irrigated lands, and semiarid plains suitable for grazing.

In general the characteristic desert consists of flat plains or valleys partly inclosed between mountain ranges. The latter are usually meridional in trend and rather short. The valleys are smoothly floored, although trenched at intervals by dry watercourses; they terminate abruptly and evenly against the mountain sides, which rise sharply above the valley level and have the appearance of having been partly buried by the upbuilding of the plains. This is actually the condition, for most of the valleys are filled by débris which has accumulated from the work of wind and water upon the rocky uplands. The desert stretches lie at various altitudes. The highest are found in central Nevada, in the Great Basin, where elevations of 5000 or 6000 feet are common. The usual average is from 2000 to 4000 feet. Death Valley in eastern California, one of the most formidable stretches of desert land within the whole region, is a depression which in the lowest part is 427 feet below sea level. Salton Desert in the southern part of that State also lies below the level of the sea. The higher mountains rise 4000 or 5000 feet above the valleys; the extreme elevations are between 10,000 and 13,000 feet above the sea.

One of the most remarkable features within the area is the Colorado Plateau and the cañon that has been carved through it by the Colorado River. The plateau is made up of a series of faulted blocks, of which the Kaibab Plateau stands 8000 to 9000 feet high and contains abundant vegetation and forest growth. Across this table-land the Colorado has incised its channel so that it now flows from 4000 to 6000 feet below the plateau level.

The widest areas of unbroken desert are included within the Great Basin, an area of 210,000 square miles that comprises most of Nevada and parts of California, Utah, Idaho, and Oregon. Few permanent streams exist there, although during the wet season torrents may descend from the higher mountains to wither in the sands. At times they form marshy tracts or shallow lakes which rapidly dry up and expose smooth, sun-baked mud flats (playas) noted for their utter barrenness. The Black Rock Desert in northwestern Nevada is an example of this type; in the winter it is occupied by the waters of Quinn River. The Great Basin in Pleistocene time was covered in part by enormous lakes, the Great Salt Lake and the smaller lakes in western Nevada being the shrunken remnants of those water bodies.

The geological structure of the Great American Desert is extremely varied, as might be concluded from its diverse surface aspects. In regard to area covered the sedimentary strata are most important, and they range in age from the pre-Cambrian beds found in the Grand Cañon to the Tertiary and Pleistocene deposits of the Great Basin. Igneous intrusions and lavas of almost every type are common, some of the latter being quite recent, although no active volcanoes occur. Well-marked craters are found in the San Francisco Mountains of Arizona, and there are many instances of fumaroles and hot springs. Great disturbances by faulting have taken place in many localities and are often evidenced by precipitous escarpments. The geological conditions have favored the accumulation of mineral deposits, which constitute the greatest single resource of the region and have been the incentive for the early explorations and most of the later industrial developments. Of metallic ores, those of gold, silver, and copper have been principally mined, but lead, zinc, quicksilver, and many of the rarer metals, also, are found in commercial quantity.

Agriculture is of increasing importance, but its possibilities must always be limited necessarily by the scanty rainfall. The annual precipitation over most of the valleys does not exceed 10 inches and in some parts is less than 5 inches. For periods of a year or more no rain whatever may fall in the more arid regions. Evaporation of course is very rapid. The water resources available for irrigation include the Rio Grande in New Mexico and Texas, Gila and Salt rivers in Arizona, the Colorado in southern California, the Humboldt and Truckee rivers in Nevada, the Snake River in Idaho, and the tributaries of Great Salt Lake in Utah, in addition to which there are smaller streams and supplies of underground waters. Great enterprise has been manifest in the development of these resources, especially in recent years. Wherever water is obtainable the soil usually shows good fertility, plant growth being very rapid.

The summer climate is hot, but on account of the dryness of the air the heat is not so oppressive as under ordinary conditions of humidity. The temperatures often rise above 100° for days at a time. The maximum in the northern deserts is around 110°, and in the south it reaches 130°. The character of the winter season depends upon the latitude and elevation, the highlands of the north having a rigorous climate, whereas in southern Arizona and California the winters are very mild.

Plant growth is sparse, but interesting in its types. Various grasses are found on most of the deserts and are collectively known as bunch grass owing to their habit of growing in scattered tufts. Members of the cactus family are very abundant, especially the prickly pear. A striking form is the giant cactus, which abounds in the Mohave and other deserts of the south; it grows to a height of 30 or 40 feet as a single stem from which arms shoot out vertically, the appearance being quite spectral when seen from a distance. Sagebrush is a common plant in the north. The Spanish bayonet, or yucca, and the mesquite are characteristic desert forms. See COLORADO DESERT; DEATH VALLEY; GREAT SALT LAKE; GREAT BASIN.

GREAT AUK. See AUK; GAREFOWL; and EXTINCT ANIMALS.

GREAT BAR'RINGTON. A town in Berkshire Co., Mass., including the villages of Housatonic and Van Deusen, 25 miles southwest of Pittsfield, on the New York, New Haven, and Hartford Railroad, and on the Housatonic River (Map: Massachusetts, A 4). It is a popular summer resort, being surrounded by remarkably picturesque scenery. It has two public libraries, Sedgwick School, Hallock School, the Hopkins Memorial Manse and several handsome estates.

Many of the town records are inscribed by William Cullen Bryant, who for several years was town clerk. The manufactures include cotton spreads, towelings, and other cotton goods, paper, electrical apparatus, etc. The government is administered by annual town meetings. Pop., 1900, 5854; 1910, 5926. Settled as early as 1725, Great Barrington formed a part of Sheffield until incorporated as a separate town in 1761. On Sept. 12, 1786, during Shays's Rebellion, a notable riot occurred here, and near by, on Jan. 25, 1787, a skirmish was fought between the militia and the insurgents. Consult Taylor, *History of Great Barrington* (Great Barrington, 1882).

GREAT BASIN. An area of inland drainage in the western United States, situated between the Wasatch Mountains on the east and the Sierra Nevada and Cascade ranges on the west. It comprises most of Nevada and portions of Utah, Oregon, Idaho, and California, and has a total area of about 210,000 square miles. The basin has a gradual slope from the north, where the elevation is 4000 feet above the sea, towards the south, forming a tilted plateau whose surface is broken by interrupted groups of mountains with a general north and south trend. The Humboldt River is the only perennial stream of any size rising in the interior of the basin, but on the borders there are numerous short streams, which have their sources in the snow fields of the Wasatch and Sierra Nevada ranges, and which act as feeders to a number of lakes, including Winnemucca, Carson, Owens, Mono, Pyramid, Sevier, Utah, and Great Salt Lake. Many of these lakes were greatly expanded during Pleistocene time. (See LAKE.) There are several large arid wastes within the basin, such as Great Salt Lake Desert, Carson Desert, and Mohave Desert, and the climate of the whole region is dry. Agriculture is confined to irrigated lands, but the mineral resources are of great importance. See GREAT SALT LAKE.

GREAT BEAR LAKE. A lake in the northwestern part of Canada, the most northerly of that chain of fresh-water lakes—Huron, Superior, Winnipeg, Athabasca, Great Slave, Great Bear—which mark extended areas of depression in the middle of the North American continent (Map: Canada, G 3). Great Bear Lake in lat. 65° to 67° N. and long. 117° to 123° W., is irregular in shape, 150 miles long, and has an area estimated at 11,200 square miles, a depth of 260 feet, and its elevation above the sea is over 200 feet. It sends a river of its own name to the Mackenzie. The lake abounds in fish. The surface is often frozen over for nine months of the year.

GREAT BEND. A city and the county seat of Barton Co., Kans., on the Arkansas River, 268 miles by rail west by south of Kansas City, on the Atchison, Topeka, and Santa Fe and the Missouri Pacific railroads (Map: Kansas, D 6). It is the centre of the wheat and alfalfa belts of Kansas and is surrounded by a rich farming and stock-raising region. The city has large flour mills, grain elevators, foundry and machine shops, and an ice plant. It contains also St. Rose's Hospital, a Carnegie library, and an Elks' home. Great Bend adopted the commission form of government in 1913. Pop., 1900, 2470; 1910, 4622.

GREAT BERKHAMP'STEAD (from AS. *borce*, birch + *hām*, home + *stede*, place). A market town of Hertfordshire, England, 28 miles north-northwest of London (Map: England, F 5). The father of the poet Cowper was rector of Berkhampstead, and the poet himself was born here. A few massive fragments of the wall of a castle still remain, to the east of the town. A free grammar school founded in the reign of Edward III still exists, and there is also a charity school founded in 1727. There is a weekly corn market, but the town has practically no industries. Pop., 1901, 6371; 1911, 7302. The town is of Saxon origin, and the kings of Mercia had a palace or castle here. William the Conqueror met the nobles and prelates at Berkhampstead, and took an oath to rule according to the ancient laws and customs of the country.

GREAT BIBLE. See BIBLE.

GREAT BRITAIN. The largest island of Europe, comprising England, Scotland, and Wales, and constituting, with Ireland, from which it is separated by St. George's Channel, the North Sea, and North Channel, the United Kingdom of Great Britain and Ireland. According to the census of 1911 Great Britain had an area of 88,729 square miles, and its population was 40,819,937. For data on topography, hydrography, climate, soil, flora, fauna, geology, mineral resources, agriculture and stock raising, manufactures, transportation and commerce, banking, population, religion, education, charities, army and navy, government, history, etc., see under UNITED KINGDOM, and the articles under the separate countries, ENGLAND, SCOTLAND, WALES, and IRELAND. For the relation of Great Britain to other component parts of the British Empire, see BRITISH EMPIRE. For an account of the part played by Great Britain in the European War of 1914, see WAR IN EUROPE.

GREAT BRITAIN, ROYAL ARMS OF. The arms of the United Kingdom of Great Britain and Ireland are quarterly, first and fourth gules, three lions passant gardant in pale, or, for England; second, or, a lion rampant within a double tressure flory counterflory gules, for Scotland; third, azure, a harp or stringed argent, for Ireland; all surrounded by the garter.

Crest.—Upon the royal helmet, the Imperial crown proper, thereon a lion statant gardant or, imperially crowned, also proper.

Supporters.—Dexter, a lion rampant gardant, or, crowned as the crest. Sinister, a unicorn argent, armed crined, and unguled or, gorged with a coronet composed of crosses pattée and fleur-de-lis, a chain affixed thereto, passing between the forelegs, and reflexed over the back, also or.

Motto.—Dieu et mon droit in the compartment below the shield, with the union rose, shamrock, and thistle ingrafted on the same stem. For illustration of Arms of Great Britain, see HERALDRY.

Arms have been ascribed by heralds to the Saxon and Norman monarchs of England in the tenth and eleventh centuries; but as heraldry was unknown till the middle of the twelfth century, the ascriptions must be fabulous.

James I, for the first time, clearly defined the royal supporters, adopting the lion of England and unicorn of Scotland as they have ever since been borne, the unicorn having been allowed the precedence in Scotland up to 1707.

GREAT CATAW'BA. See WATEREE.

GREAT CHARTER. See CHARTER; MAGNA CHARTA.

GREAT CIRCLE SAILING. See SAILINGS.

GREAT COMMONER, The. A popular title of William Pitt, the elder, before he became Earl of Chatham and changed from the House of Commons to the House of Lords.

GREAT-CRESTED FLYCATCHER. See Kingbird.

GREAT DANE. A dog. See Hound.

GREAT DAU'PHIN, The. A name given to the Dauphin Louis, son of Louis XIV.

GREAT DUKE. A title given to the Duke of Wellington.

GREAT DUKE OF FLORENCE, The. A drama by Massinger, licensed in 1627 and published in 1635.

GREAT EASTERN. At the time of her construction, the largest ship in the world. It was not until 1901, when the *Celtic* was completed, that her equal in size was produced. She was never a financial success, having been built when the trade and conditions suitable to a ship of her size did not exist. In 1852 the Eastern Steam Navigation Company was formed, to maintain an ocean steam route to the East round the Cape of Good Hope. In 1853 the directors came to a conclusion that, owing to the cost of maintaining coaling stations on the way, such a route would not pay unless the ship could carry coal enough for the voyage out and home, besides a large number of passengers and a great cargo. The scheme was for a ship that would accommodate 1000 passengers, 5000 tons of merchandise, and 15,000 tons of coal for fuel. The result was the construction of the *Great Eastern.* Her arrangements (setting aside later alterations) were briefly as follows: length, 680 feet between perpendiculars, or 692 feet upper deck; breadth, 83 feet, or 118 over paddle boxes; depth of hull, 60 feet, or 70 to top of bulwarks. The propelling power comprised both paddle and screw. The paddle engines had 4 boilers, each with 400 brass flue tubes; there were 4 engines, with cylinders of 14-feet stroke and 74 inches diameter; the paddle wheels were 56 feet diameter by 13 deep, with 30 arms or radii. The screw engines had 6 boilers; the 4 engines had cylinders, each 4-feet stroke by 84 inches diameter, with piston rods 7½ inches thick; the propeller shaft was 160 feet long, and in some parts 24 inches in diameter, with a screw propeller 24 feet in diameter. The vast wall-sided compartments of the ship had facilities for conversion into cabins for 800 saloon passengers, 2000 second class, 1200 third class, and 400 officers and crew; or 5000 might have been accommodated in all, if emigrants or troops.

Twenty years of the ship's history presented a singular series of vicissitudes. During 1854–57 its building proceeded at Millwall. By November of the latter year the ship had advanced to the launching condition. Either the ship was too heavy (12,000 tons) or the slope was too gradual, for it required various attempts, between Nov. 3, 1857, and Jan. 31, 1858, and an expenditure of £60,000, to effect the launching. During 1858 and 1859 the work continued as fast as the company could supply money. Uncertain how far the original intention of a trade to and from Australia could be realized, the directors determined on a trial trip across the Atlantic. It was a disaster. The ship left the Thames Sept. 8, 1859. An explosion of steam pipes took place off Hastings; seven persons were killed and several wounded, and the voyage abruptly came to an end at Weymouth. The ship started again on June 17, 1860, from Southampton, and crossed the Atlantic in 11 days, reaching New York on the 28th. Continuing on this route during the remainder of 1860 and the greater part of 1861, she made many voyages to and fro, continually losing money for the owners and constantly requiring repairs. In December, when political relations with the United States looked ominous, the *Great Eastern* served as a troopship.

In 1864 negotiations were entered into with the Atlantic Telegraph Company and the Telegraph Construction and Maintenance Company for the employment of the *Great Eastern* as a cable-laying ship, and the arrangement and services of the ship in 1865 and 1866 will be found briefly noticed under Atlantic Telegraph. In 1867 the vessel was reconverted from a cable-laying to a passenger ship, in order to provide for the travel to the Paris Exposition, and extensive renewals of machinery were made. The ship started from Liverpool for New York in May; but the speculation proved an utter failure.

In 1868 a new arrangement was made by which the ship was to be permanently chartered by the Telegraph Construction and Maintenance Company. The name, which had been changed to *Leviathan,* then to *Great Eastern,* and then to *Great Ship,* was again changed to *Great Eastern.* Between 1869 and 1874 the *Great Eastern* successfully laid some of the most important telegraphic cables—across the Atlantic, in the Mediterranean, in the Red Sea, etc.; in 1884 became a coal hulk in the harbor of Gibraltar; in 1887 was sold, to be broken up, for $82,500. For increase in size of steamers since the *Great Eastern,* see Steam Navigation.

GREAT ELECTOR, The (Der grosse Kurfürst). A name given to Frederick William, Elector of Brandenburg (1640–88), who, because of his wisdom and labors in behalf of his people, is looked upon as the founder of Prussia's present greatness.

GREAT EXPECTATIONS. A novel by Charles Dickens, originally issued in *All the Year Round* (1860 to 1861), published 1861.

GREAT FALLS. A city and the county seat of Cascade Co., Mont., on the Missouri River, 98 miles northeast of Helena; on the Chicago, Milwaukee, and St. Paul and the Great Northern railroads (Map: Montana, E 2). It is in a productive mining region, and is noted for its great copper, gold, and silver smelting and refining works; besides these metals, lead, iron, zinc, gypsum, hematite, bituminous coal, and sandstone are found in the vicinity. The city has also extensive manufactories of flour and mine machinery, breweries, and coal mines; is a great shipping point for wool; and is the distributing centre for a large and rich agricultural and mineral region. There are two steel wagon bridges 1000 feet long, two railroad bridges, a Carnegie library, a fine courthouse, a city hall, a handsome hotel, and a park system which includes seven parks, aggregating 600 acres. The locality presents great scenic attractions. The Missouri here, in a distance of seven miles, has an aggregate fall of 526 feet. The most notable of its waterfalls are Rainbow and Great Falls, from the latter of which the city derives its name. The water power now developed, at medium low water, amounts to almost 200,000 horse power, and this, together with inestimable mineral wealth, has contributed to the importance of the city as a manufacturing and commercial place. Great Falls was settled in 1884, and incorporated four years later. The government is administered by a mayor, elected biennially, a unicameral city council, and subordinate officials. The city owns and operates its water works. Pop., 1900, 14,930; 1910, 13,948.

GREAT FISH, or **BACK, RIVER.** A river of the Northwest Territories, Canada, rising in a small lake near the north shore of Lake Aylmer (Map: Northwest Territories, J 1). It flows through Lakes Beechy, Pelley, and Garry, and enters the Arctic Ocean by a wide estuary, off the entrance to which is King William Land, after a northeast course of about 500 miles. It was explored in 1834–35 by Sir George Back (q.v.), who describes the Ah-hel-Dessy, or Parry Falls, on one of the tributaries, as "surpassing Niagara Falls in splendor of effect." Montreal Island, in the estuary, has a melancholy interest in connection with the discovery of the final relics of Franklin in 1859.

GREAT FISH RIVER. A river in Cape of Good Hope Province, South Africa, rising in the Sneeuwberg, or Snowy Mountains, and, after a generally southeasterly course of 230 miles, entering the Indian Ocean about 5 miles northeast of Port Alfred (Map: Cape of Good Hope, H 9). A bar at its mouth renders it inaccessible to ships. The Midland Railway from Port Alfred and Port Elizabeth skirts its banks upward from Commadagga to Middleburg.

GREAT GRIMSBY. See GRIMSBY, GREAT.

GREAT HARRY. A three-masted vessel built under Henry VII in 1509, at a cost of £14,000, the first double-decker to be built in England and the first war vessel of the British navy. She was burned by accident at Woolwich in 1553.

GREAT HAR′WOOD. A coal-mining town in Lancashire, England, 3 miles northwest of Accrington. Pop., 1901, 12,015; 1911, 13,815.

GREAT′HEAD, JAMES HENRY (1844–96). A British engineer and inventor. He was born at Grahamtown, Cape Colony, and went to England in 1859. While studying engineering under P. W. Barlow, he became interested in the shield method of tunneling and in problems of underground railways for city traffic. In 1869 he constructed a subway under the Thames River near the Tower. He engaged thereafter in independent engineering operations, made improvements in his modification of the shield, patented his "Ejector" fire hydrant, and undertook to introduce the Hallidie cable system into England. In 1886 he drove the tunnels by means of the Greathead shield for the City and South London Railway. He also undertook the construction of the Waterloo and City underground line.

GREAT′HEART, MR. The brave guardian of Christiana and her children, and their guide to the Celestial City, in Bunyan's *Pilgrim's Progress*.

GREAT HORNED OWL. See EAGLE OWL.

GREAT KANAWHA, kȧ-na̤′wȧ. A name formerly applied to the Kanawha River (q.v.) of West Virginia.

GREAT LAKES. A series of inland seas comprising Lakes Superior, Michigan, Huron, St. Clair, Erie, and Ontario. They lie on the frontier of the United States and Canada and are drained by the St. Lawrence River into the Atlantic. Their aggregate area is about 94,100 square miles, exceeding that of any other series of fresh-water lakes in the world. Lake Superior, the largest, has an area of about 32,000 square miles. The Great Lakes occupy depressions that are only separated by low reliefs from the drainage system of the Mississippi and from the depression of Hudson Bay, the entire drainage area or watershed plus water surface amounting to 288,245 square miles. Their elevation ranges from about 600 feet in Lake Superior to 234 feet in Lake Ontario, but from Lake Superior to Lake Erie the fall is 36 feet, so that almost the entire descent is accomplished in the Niagara and St. Lawrence rivers. The Great Lakes exercise a very beneficial influence upon the climate of the country immediately adjacent, particularly by moderating the temperature. This explains the extensive development of fruit culture in parts of the Great Lake region, notably in the vicinity of Lake Erie.

The magnitude and importance of transportation upon the Great Lakes are not generally realized. Vessels representing almost one-half of the gross tonnage in the United States merchant marine are found upon the Great Lakes. A greater tonnage annually passes through the Detroit River than that which enters and clears in the foreign trade of the Atlantic and Pacific coast ports. No other artificial channel in the world equals the canal at St. Mary's Falls in the amount of traffic which annually goes through it, the tonnage even exceeding that of the Suez Canal. With respect to rapidity, economy, and efficiency, the lake traffic excels that of the ocean. The coastal line of the Great Lakes touches eight of the States, whose aggregate population is over one-third that of the Union. The sailing distance from Duluth to Buffalo is 997 miles; from Chicago to Buffalo, 929 miles; and from Duluth to Ogdensburg, 1235 miles. The vast region tributary to the Great Lakes is the richest part of the country in the products of farm, forest, and mine. The bulkiness of these products is such that a water route becomes of especial value in their transportation. The greatest significance of the lakes is due to their relation to the mining of iron ore and the manufacture of iron products. Viewed in this light, lake transportation is found to be an important factor in the modern industrial progress and supremacy of the United States. It is generally admitted that but for the cheapness of the lake transportation the iron-ore resources of the Lake Superior region would have been scarcely exploited. Without the supply of iron ore many vast industries could not have thrived.

The nature of shipping and its development have been closely dependent upon the depth of the channels connecting the different lakes, particularly the passages between Lake Superior and Lake Huron and between the latter and Lake Erie. Prior to 1858 the channel entering Lake St. Clair was only 9½ feet in depth, but by means of appropriations of the United States government one of the entering channels was deepened to 13 feet by 1871 and to 16 feet by 1874, in which state it remained until 1887, when the work of deepening began anew, and it was completed to a depth of 20 feet. The Detroit River was not originally so shallow, and with the improvements provided for during the period from 1874 to 1913 a channel 22 feet deep and with a breadth of 600 feet, known as the Amherstburg Channel, was dredged, while a second channel, known as the Livingston Channel, with a least depth of 22 feet, provides a route for down-bound vessels and facilitates commerce materially. The Canadian government is now constructing a canal from Lake St. Clair to Lake Erie which will greatly shorten the route. The construction of the first canal at St. Mary's Falls was begun under a land grant of the State of Michigan by a private corporation in 1853 and was opened with a depth of 12 feet in 1855. Under an appropriation of the United States government the canal was deepened between 1870 and 1881 to a depth of 16 feet and subsequently to a depth of 21 feet. Under the Act of 1886 a new lock, 800 × 100 and 21 feet deep, was built and the canal extended. Then in 1907 and 1912 two new locks and canal sections were provided for, and in 1915 these were under construction. These locks are 1350 feet long, 80 feet wide, and 24.5 feet deep at extreme low water. (See SAINT MARYS CANAL.) Canada has also constructed a canal around these falls, which, while used by fewer vessels than the United States canal, is used by the larger craft and in recent years sometimes has accommodated the greater part of the freight. A new lock of increased length, 1715 feet (1350 between inner gates) and 24.5 feet in depth, has been constructed, but the deepening of the approach channels is also involved. In 1914 the Canadian lock afforded a slightly greater draft for down-bound boats and consequently was employed more by heavily laden craft in this direction. No tolls are charged on either canal. The Welland Canal, connecting Lake Erie and Lake Ontario, has been completed by the Canadian government to a depth which admits the passage of vessels with a draft of 14 feet, and through it must go all vessels built on the Great Lakes and designed for deep-sea service. In 1914 a beginning was made on the new Welland Canal (q.v.), capable of taking boats as long as 800 feet and 25 feet in depth. With each successive deepening of the channels the size and draft of the vessels constructed have been increased, with a resulting cheapening of the rates, which in turn has tended to increase the traffic and stimulate the tributary industries. Over $25,000,000 has been spent in deepening and improving the channels in the upper lakes and their connecting waters. A number of vessels now in use have a draft of 17 feet. Some of them have a length of over 600 feet and carry 12,000 tons of cargo.

Besides their great length these vessels differ from the ocean type in that they are flat-bottomed, the purpose being to carry the greatest possible cargo on the shallow draft to which they are limited. On no other waters is so great a cargo carried on so small a draft. Many of the larger vessels, besides carrying their own cargo, take one or more barges or sailing vessels in tow. Many of the vessels classed as sailing vessels are little more than barges, their sails being spread only when the wind is especially favorable. Prior to 1883 the tonnage of the sailing vessels exceeded that of the steam vessels, but since that date the tonnage of sailing vessels has remained about constant, while that of steam vessels has almost trebled. In 1897 the gross tonnage of steam vessels was 975,000 tons, the sail vessels a little over one-third that amount, and the barges 55,000 tons. In 1912 sailing vessels had a tonnage of 225,114; steamers, 2,575,914; and barges, 100,688. The total gross tonnage of the lakes increased from about 450,000 tons in 1870 to 690,000 tons in 1886, 1,370,000 tons in 1897, and to 2,949,924 tons in 1912. The accessibility to resources of coal and iron has given the lake region unequaled advantage in the construction of ships. In 1913 the 166 vessels built on the Great Lakes had a tonnage of 80,079 as compared with 302,490 tons for the 1335 vessels built in other parts of the United States. Treaty provisions prevent the United States from building war vessels on these waters. The increase in lake traffic has been much greater than the increase in tonnage. This is due to the greater rapidity both of sailing and of loading and unloading vessels, especially those carrying ore and coal. The efficiency in the latter respect is not equaled in any other part of the world. A round trip from the head of Lake Superior to the eastern Lake Erie ports is now made in 10 days. Thus an average of 20 round trips in a season can easily be made. Freight rates have fluctuated greatly from year to year, so that the comparison of years may be misleading, but the general downward tendency has been very rapid. In 1914 ore was carried at a rate of 45 cents per ton, and on the return journey coal was carried from Lake Erie to Lake Michigan ports at the rate of 35 cents per ton, which was only a small fractional part of the expense by rail. Wheat was carried from Duluth or Chicago to Buffalo at a rate as low as 3½ cents per bushel in 1913, though in the previous year 5 cents per bushel had been secured—nevertheless, a rate that was cheaper than that current in ocean traffic. The fact that coal constitutes a large product for return shipment makes a much lower rate possible than could otherwise be secured. The movement of freight upon the lakes is characterized by the great predominance of the east-going traffic over the west-going trade (especially the east-going traffic from the Lake Superior region), by the importance of the Lake Erie ports for the exchange of the east-going for the west-going products, and by the fact that the bulk of the traffic centres upon a very few commodities.

Formerly the lower lake region was of greater relative importance, but in consequence of the enormous increase in iron mining in the Superior region, and also the increase in lumbering and grain raising in the tributary region, the increase in the tonnage of lake shipments during recent years has been mainly in the tonnage originating in the Lake Superior region. The lake ore shipments in 1913 aggregated 49,070,478 tons. The concentration of the transfer of the east-going for the west-going traffic on the Erie coast is due principally to the fact that it is through these ports the iron ore must pass to reach the coal and the smelting region, while in turn, in consequence of the nearness of these ports to the coal mines, they are the most convenient points for the loading of the coal, which constitutes the bulk of the west-going freight. Lumber also finds the shortest route to the manufacturing centres through these ports, and grain here makes connection with rail routes or the Erie Canal, whence there is easy transit to the Atlantic coast. It is probable that the latter product will be carried on the St. Lawrence route much more extensively than it is when the Welland Canal around Niagara Falls is deepened so as to admit the passage of the large lake vessels. According to the government reports for 1911, the items of domestic commerce, under shipments from lake ports, were: wheat, 42,292,488 bushels; flour, 1,152,807 short tons; coal, 23,148,301 short tons; iron ore, 31,216,248 long tons; and lumber, 1,164,544 M feet. The ports having a tonnage of more than 4,000,000 were in 1911, in descending order, Superior-West Superior, 8,817,305; Milwaukee, 8,429,839; Chicago-South Chicago, 7,797,128; Duluth, 7,343,435; Buffalo, 6,684,001; Cleveland, 5,225,772; Ashtabula, 5,061,140; in 1912, Duluth-Superior (the two ports are now combined), Buffalo, Cleveland, Two Harbors, and Milwaukee. Chicago fell below the 4,000,000 mark.

The registered tonnage passing through the canals at Sault Ste. Marie in 1913 was 57,989,715; the total freight was 79,718,344 short tons, of which 58,654,733 tons passed through the United States canal. The tonnage passing through the St. Mary's Falls canals was valued at $334,502,686 in 1904 and $865,967,000 in 1913. The number of vessels entering the main lake ports in the year ending Dec. 31, 1911, was as follows: Chicago, 6179; Buffalo, 2824; Cleveland, 3134; Milwaukee, 5742; Detroit, 3590; and Duluth, 2680. The bulk of the lake traffic is American.

There are numerous harbors along the coast line of the lakes. Many of these havens are shallow, and constant dredging is required to keep them accessible. The national government has expended large sums on harbor improvements. In late years there has been a serious lowering in the level of the lakes' surface, to the great detriment of the harbors. The mean lake level taken as a basis is that for the period 1860–75 and 581.63 feet above mean tide at New York. In 1913 it was stated that at the highest stage the water level on the eastern shore of Lake Michigan was about ½ foot below mean lake level, this occurring in July and August, while the lowest stage is from 1½ to 2 feet below the mean lake level and is experienced from November to April. Any lowering of the water level means less draft in freight steamships and lighter loading, and shipping interests have always resisted any attempt to divert water, by the Chicago Drainage Canal (q.v.) or otherwise, that would bring the level down. A change of 1-foot draft on a big cargo carrier means 10 per cent less load. Different plans have been projected for preventing further lowering of the level, and the United States government attempts to regulate the amount of water that may be diverted for any purpose. The International Waterways Commission in a report (1907) recommended the diversion of more than 10,000 cubic feet per second for the Chicago Drainage Canal which previously had been placed at 5000 cubic feet per second (1899) and in 1901 was fixed at 4157 cubic feet—an amount it was retained at notwithstanding petitions for its increase. Dams have been constructed across the exit channels of the lakes. One of the most serious disadvantages with which the lake commerce has to contend is the winter ice, which stops all traffic. The cessation of general lake traffic begins about the first of December and continues four or five months, about 222 days being the average annual time during which the canals are open. Much has been done to continue the period of traffic by the construction of boats with special provisions for ice crushing. Railroad ferryboats have also been constructed which are able to crush their way through thick ice.

The problem of the further improvement and increase of lake transportation is one of much significance to the country and has occasioned a great deal of interest and speculation. Schemes have been projected with the view to making the lake ports directly accessible to ocean-going vessels, and through waterways from the lakes to the gulf. In fact, it was proposed to accomplish this in connection with the Chicago Drainage Canal. The interests of Canada as well as those of the United States are involved in all proposed improvements of through waterways, thus occasioning a rivalry between the two nations. For instance, there is an all-United States route from the Great Lakes to the sea in the New York State Barge Canal (q.v.), capable of accommodating 1000-ton barges. An all-Canadian route is also proposed to connect the Georgian Bay with the Ottawa River. A proposed international route includes the St. Lawrence River, Lake Champlain, and Hudson River; but such schemes must be understood rather as referring to self-propelled barges than to ocean steamers.

With the growth of cities on the shores of the Great Lakes the preservation of the purity of the waters became a serious question of interest to both the United States and Canada, as such water is used for domestic consumption. On Jan. 11, 1909, a treaty was signed providing that boundary waters "shall not be polluted on either side of the boundary to the injury of health or property on the other." An international joint commission proceeded to investigate the pollution of these waters with a view to determine in what way it may be prevented or remedied according to the terms of the treaty. This commission was still in session during 1914. It found that while the greater part of the water of the Great Lakes remained in its original purity, yet there were certain zones of pollution where the extent of the evil was indeed serious. Purification methods were considered essential where the untreated water was used, and in most cases such methods are being practiced by the cities along the Great Lakes where there is any chance of pollution by sewage or discharge from vessels. Consult: Channing and Lansing, *Story of the Great Lakes* (New York, 1909); Mills, *Our Inland Seas* (Chicago, 1910); Johnson, *Highways and Byways of the Great Lakes* (New York, 1911); also publications of the United States Coast and Geodetic Survey.

The Great Lakes are valuable for their fisheries. The average annual catch by American fishermen (1899 to 1903) exceeded $2,500,000 in value. In 1908 it equaled $3,767,000.

GREAT LAKE TROUT. See Namaycush.

GREAT MANITOULIN, măn′ĭ-to͞o′lĭn. See Manitoulin Islands.

GREAT MAR′LOW. See Marlow.

GREAT MAR′QUIS, The. A surname of the famous Portuguese statesman, the Marquis de Pombal (1699–1782), and also of the noted Scottish statesman, the first Marquis of Montrose (c.1612–50).

GREAT MASTER OF LOVE. A title given by Petrarch to Arnaut Daniel, the troubadour who invented the sestina.

GREAT MOGUL. A diamond. See plate of Diamonds.

GREAT MOGUL. See Mogul.

GREAT MOTHER (Lat. *Magna Mater*). An epithet applied by the Romans to the goddess Cybele or Rhea, as the representative of the pro-creative powers of nature. Consult Showerman, "The Great Mother of the Gods," in *Bulletin of the University of Wisconsin* (Madison, 1901).

GREATOREX, grāt′ō̇-rĕks, Eliza (Pratt) (1820–97). An American etcher, born at Manor Hamilton, Ireland. She came to New York in 1840 and in 1849 married Henry W. Greatorex, the organist and composer. She studied art in New York in 1854–56 and in Paris in 1862. At first she produced many landscape paintings, but afterward devoted herself to etching and to pen-and-ink work. In 1869 she was elected an associate of the National Academy. About that time she began a series of sketches of historic buildings and scenes in and around New York. She was in Germany in 1870 and in the following year, where she published *The Homes of Oberammergau.* Returning to the United States, she published *Summer Etchings in Colorado* (1873) and *Old New York from the Battery to Bloomingdale* (1876).

GREAT PACIF′ICATOR, The. A sobriquet of Henry Clay, based upon his services in harmonizing conflicting interests through the Missouri Compromise.

GREAT PEDEE (pē̇-dē′ *or* pē′dē) **RIVER.** The name formerly applied to the Pedee River (q.v.).

GREAT′RAKES, Valentine (c.1628–83). An Irish soldier and "healer," born at Affane, County Waterford. At the outbreak of the Irish Rebellion in 1641 he fled to England and for six years lived in the homes of relatives. From 1649 to 1656 he served in Ireland under Cromwell. About 1661 he felt that he had been given divine healing power and had what seemed to be remarkable success in "touching" for scrofula, ague, and other diseases, though an exhibition before the King proved a failure. Several pamphlets by medical men and other critics were published, attributing his cures to miraculous agencies, and in 1666 Greatrakes published a vindication of himself entitled *A Brief Account,* accompanied by numerous testimonials. He retired soon afterward to his estate at Affane, where he died.

GREAT RIFT VALLEY. The name given to a great depression which extends from Palestine in Asia to the southern end of Lake Tanganyika in Central Africa. The depression is formed really by a series of rift valleys which begins in the north with the Jordan and Dead Sea valleys, extending thence through the Red Sea basin to the strait of Bab-el-Mandeb, and across French Somaliland and Abyssinia to Lake Rudolf in British East Africa. Here the depression divides; one branch runs southward to beyond Lake Manyara, and the other takes a westerly course to Albert Nyanza, where it turns southward to the shores of Lake Tanganyika. The Great Rift Valley owes its origin to long parallel fissures or cracks in the earth's crust between which the strata have subsided, forming narrow, elongated troughs. In Central Africa the valley is frequently limited on either side by bare walls of rock which rise precipitously to the level of the adjoining plateau, 4000 to 5000 feet above the sea. Elsewhere the evidence of faulting is not so apparent. Most of the great African lakes are situated in this valley. The formation of the fissures was accompanied by enormous volcanic activity, of which there are evidences in great sheets of lava, extinct volcanoes, and a few active cones. See Africa.

GREAT SALT LAKE. An extensive sheet of salt water in northwestern Utah, near which is situated Salt Lake City. It lies in one of the great valleys of the Rocky Mountains on the eastern edge of the Great Basin (q.v.), and is about 75 miles long and 30 to 50 miles wide. There are nine islands in the lake, one of which is 16 miles and another 12 miles in length. The lake occupies a shallow depression, with an average depth of less than 20 feet; the surface lies about 4218 feet above sea level. Owing to the annual variation of rainfall in the region, the lake is subject to great fluctuations in area; in 1850 its area was 1750 square miles, but it had increased to 2170 miles in 1869. During the period 1886–1902 the waters subsided considerably and sank to an average depth of 13 feet, the same as 50 years ago. The lake receives from the south, through the Jordan River, the waters of Utah Lake, which are fresh, and from the north the drainage of Bear River, but it has no outlet. Its water is a natural brine, containing from 14 to 23 per cent of saline constituents, according to the level of the lake. Sodium chloride, or salt, is the principal constituent and is estimated at 400,000,000 tons for the whole basin. The manufacture of salt by evaporation of the lake water is an important industry. Several species of insects and a small shrimp (*Artemia gracilis*) have been found in these waters. The first mention of Great Salt Lake was by Baron La Hontan in 1689, who gathered some information concerning it from the Indians west of the Mississippi. It was first explored and described by Frémont in 1843. A survey was made in 1849–50 by Stansbury, and more elaborate surveys in recent years by the United States Geological Survey. Gilbert has shown that the lake in Pleistocene time covered a much larger area. (See Lake.) Garfield Beach, on the southern shore of Great Salt Lake, is a bathing resort visited by many tourists for the novelty of a bath in the waters, which are so heavy that the body easily floats. See Utah.

GREAT SEAL. The official sign of the royal authority in England. All documents of importance emanating from the crown, as grants, charters, and writs, were formerly required to be authenticated by it. It was called "the key of the kingdom," and was intrusted to the Lord Chancellor, who was also known as the Lord Keeper of the Great Seal. In the reign of Edward I it became customary to issue writs under the privy seal, which might be affixed by any secretary of the King, but this practice was forbidden by statute in 1300. By the Act of Union which united England and Scotland under one government (5 Anne, c. 8), one great seal for the United Kingdom of Great Britain is used for sealing writs to summon Parliament, for treaties with foreign states, and all public acts of state affecting Great Britain. The holder of the great seal is still the Lord Chancellor. A seal is also kept in Scotland for sealing grants and writs affecting private rights there. As regards Ireland, the Act of Union (39 and 40 Geo. III, c. 67) provided that various acts, as to summoning Parliament, etc., should be done under the great seal of the United Kingdom; but in other respects the great seal of Ireland is used in the same manner as before the union.

GREAT SLAVE LAKE. An extensive and irregular sheet of water in the Northwest Territories, Canada (Map: Canada, H 4). It has an area of 7100 square miles. Its greatest length is about 300 miles, and its greatest breadth 60 miles. It is surrounded, especially on the north, by rugged, precipitous, and barren shores; the west shore and its many islands are well wooded. It is wholly frozen over for six months of every year and is navigable only from July to November. On the north it receives the surplus waters of Lakes Aylmer and Artillery, and on the south those of Lake Athabasca through the Great Slave River. Its own surplus is carried off by the Mackenzie River to the Arctic Ocean.

GREAT SLAVE RIVER. A river of Alberta and the Northwest Territories, Canada. It is the outlet of Lake Athabasca into Great Slave Lake and flows in a northwest direction from the former to the latter (Map: Canada, H 4). It is about 300 miles in length; its banks in many parts are well wooded, and its course in the lower part lies through a fertile alluvial region. With the exception of 13 miles of falls and rapids near Fort Smith, it is navigable for river and seagoing steamers during a part of the year.

GREAT SOUTH BEACH. See FIRE ISLAND.

GREAT STONE FACE, THE. One of Nathaniel Hawthorne's short stories, which appeared in 1852 in *The Snow Image, and Other Twice-Told Tales.*

GREAT TOM. A 17,000-pound bell which hangs in the tower of the Tom Gate of Christ Church, Oxford.

GREAT UNWASHED, THE. A designation applied to the multitude. It was used by Sir Walter Scott and is attributed to Edmund Burke.

GREAT VALLEY. The valley between the Blue Ridge and the Alleghanies (qq.v.).

GREAT WALL OF CHINA. See CHINESE WALL.

GREAT WHITE PLAGUE. See TUBERCULOSIS.

GREAVES, grēvz (from OF. *greves*, from *greve*, shin). Pieces of armor used as a defense for the legs, originally made of leather, quilted linen, etc., and afterward of steel hollowed to fit the legs and fastened with straps behind.

GREAVES, grāvz, JOHN (1602–52). An English mathematician. He was born at Colemore, Hampshire, graduated at Balliol College, Oxford, in 1621, and in 1630 became professor of geometry at Gresham College, London. He traveled in southern Europe and Egypt, collecting valuable manuscripts, gems, and coins, and making measurements of monuments. In 1643 he was chosen Savilian professor of astronomy at Oxford, but five years later was ejected by the Puritans. Among his numerous works were: *Pyramidographia, or a Description of the Pyramids in Ægypt* (1646); *A Discourse of the Roman Foot and Denarius* (1649); *Elementa Linguæ Persicæ* (1649). His collected works were published in 1737 by Dr. Thomas Birch, with a biographical sketch.

GREAVES, LAUNCELOT. The hero of Smollett's novel of the same name.

GREBE (Fr. *grèbe*, from Bret. *krib*, Welsh, Corn. *crib*, comb). A bird of the family Colymbidæ, having the feet not webbed in the usual manner, but lobate; i.e., with a separate membrane for each toe, united only at the base. The tarsi (shanks) are so much compressed as to be almost like blades. The claws are large and flat. The bill is about as long as the head, straight and conical. The wings are short. There is no visible tail. The legs are attached so far back that the birds when on land assume an erect position, like penguins. They walk with difficulty, and all their motions on land are awkward. They sometimes shuffle along on their bellies like seals. But in water they are extremely agile; they swim rapidly, dive with extreme quickness if alarmed, and pass to very considerable distances under water. They feed on fishes, batrachians, crustaceans, and other aquatic animals, partly also on vegetable food. They are said sometimes to carry their young under their wings, and even to take them under water with them in diving to escape from enemies. The geographical distribution of the group is very wide, and some of its species are also very widely distributed. Grebe shooting is a favorite amusement in some places. The grebe is pursued by a boat, while it seeks to escape by diving and swimming under water.

One incentive to this hunting is the demand of fashion for grebe skins. The plumage of the breast is very dense, silky, and warm, and has been in great vogue for women's muffs and for hat and dress trimmings. Thousands of these interesting birds are sacrificed yearly for these trivial purposes—a slaughter which ought at once to be stopped. None of the grebes are bright-colored, black, brown, gray, and white being the usual shades, but a few forms have steel-blue, tawny, or rich reddish-brown markings on the head and neck. When in full breeding plumage some have the head ornamented with handsome tufts. In this condition their appearance is very different from that of the young or the adults in winter. Rather more than 20 species of grebes are known, of which at least half a dozen are North American. The best known of these is the dabchick, which is closely allied to the European little grebe (*Colymbus ruficollis*). The American dabchick, or pied-bill grebe, or hell-diver (*Podilymbus podiceps*), is a common bird from the Argentine Republic northward to Hudson Bay, and it breeds locally throughout its range. It winters from the middle United States southward. It is small, not much more than a foot long, brownish black above, fading into pure white on the belly. The bill is light bluish, encircled by a broad black band. The dabchick is an exceptionally expert swimmer and can swim for some distance with only its bill above water. The nest is made of vegetation in the water, sometimes practically floating on the surface, so that the young can take to the water as soon as they are hatched.

The largest American species is the Western grebe (*Æchmophorus occidentalis*), which is from 2 to 2½ feet long, and has a straight, slender, and acute bill, 3 inches long. There are two very distinct varieties, one much smaller than the other, but both are common in the western United States. The red-necked grebe (*Colymbus holbœlli*) is another large species, 19 inches long, found throughout North America, but in the United States only in winter. Two of the commonest American grebes are the horned grebe (*Colymbus auritus*) and the American eared grebe (*Colymbus nigricollis californicus*). The former is found throughout North America, the latter only west of the Mississippi. The smallest American grebe is the Mexican grebe (*Colymbus dominicus brachyp-*

terus), which is found in the warmer parts of America and only as far north as the valley of the Rio Grande. It is less than 10 inches long, the bill is very short, and there are no crests or ruffs. The great-crested grebe of Europe (*Colymbus cristatus*) is a large and conspicuous species, 2 feet long; its occurrence in North America seems to be very doubtful. See Plate of ALBATROSS, AUKS, ETC.

GRECCHETTO, grĕ-kĕt′tō, IL. See CASTIGLIONE, GIOVANNI BENEDETTO.

GRECHANINOFF, grĕ′chȧ-nĭ′nôf, ALEXANDER TIKHONOVICH (1864–). A Russian composer, born in Moscow. He received his first musical training at the Moscow Conservatory under Safonoff. In 1890 he entered the conservatory in St. Petersburg, where he studied composition for three years with Rimsky-Korsakoff. The following year his string quartet, op. 1, won a prize and attracted considerable attention. Before long he had gained fame as one of the foremost Russian composers of sacred music, although outside of his native land he is best known through his songs and instrumental works. His compositions include two symphonies, two string quartets, incidental music to Ostrovsky's *Snegouruchka,* to A. Tolstoi's *Czar Feodor* and *Czar Boris,* songs, and piano pieces. Two operas, *Dobrinya Nikitich* (1903) and *Sœur Béatrice* (1912), exhibit strong dramatic talent.

GRECIAN COFFEEHOUSE. A well-known place of meeting for the wits of the eighteenth century, situated in Devereux Court, London.

GRECIAN DAUGHTER, THE. Arthur Murphy's best-known tragedy, produced in 1772 and played as late as 1830.

GRECIAN GAMES. See GAMES, ANCIENT.

GRECO-. See GRÆCO-.

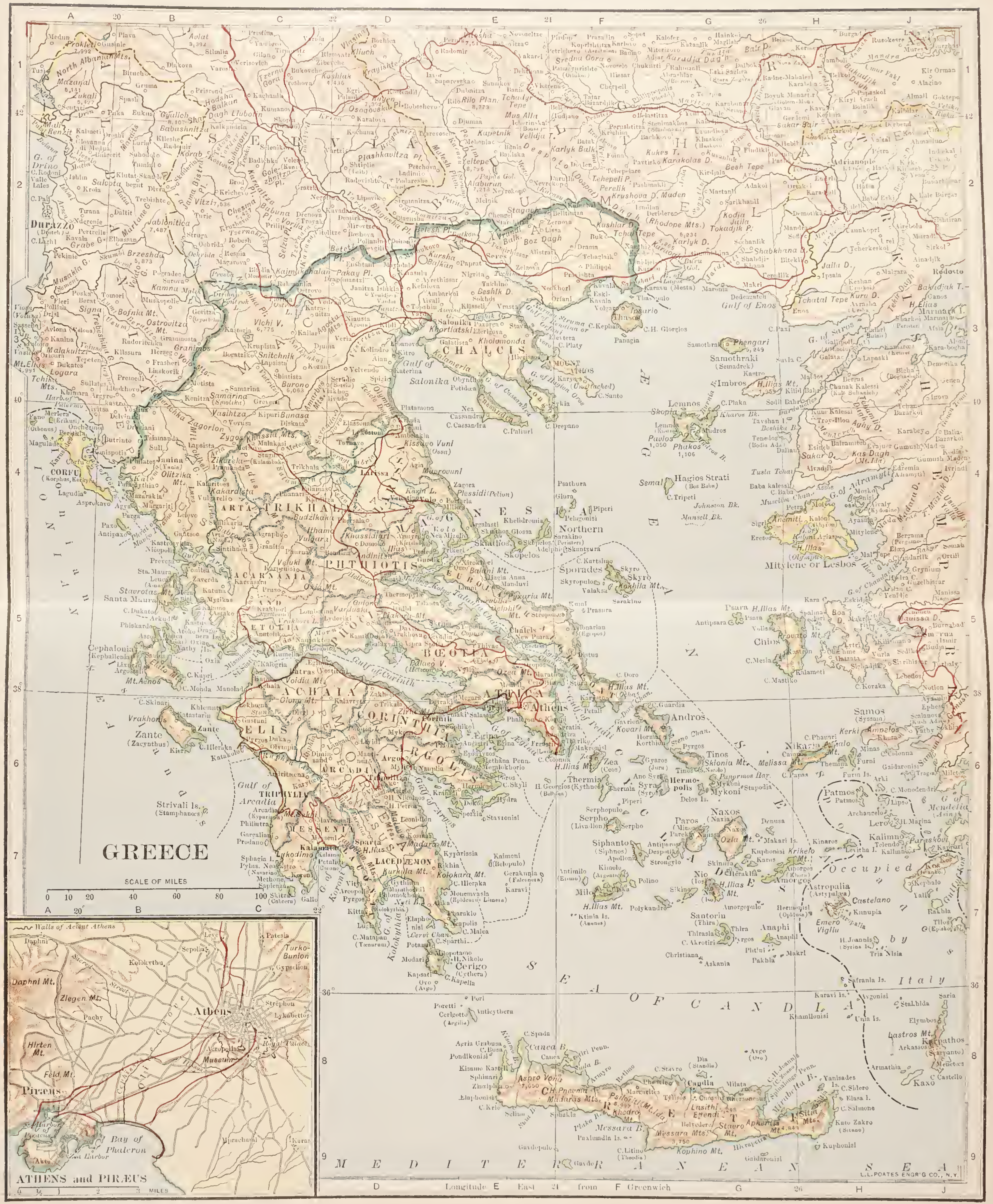
GREC′O, EL. See THEOTOCOPULI, DOMENICO.

GREECE. A kingdom occupying the southern prolongation of the Balkan Peninsula, between the Ægean and Ionian seas. Its mainland extends southward from about lat. 41° 30′ N. to Cape Matapan in lat. 36° 23′. On the north, the only land boundary, lie Albania, Servia, and Bulgaria. Greece includes, in addition to the provinces on the mainland, numerous islands, in both the Ægean and Ionian seas. The total area, 41,933 square miles, includes newly acquired (1912–13) territories aggregating 16,919 square miles, made up as follows: Adrianople, 112 square miles; Saloniki, 9300 square miles; Janina, 2801 square miles, and Monastir, 4706 square miles; in other words, the area of Greece is nearly that of England. The above figures of additions of 1912–13 do not include the Ægean islands added by the treaties of London and Athens, of which the details are not yet complete. The area was reduced to the extent of 170 square miles by the Treaty of 1897, ending the war between Greece and Turkey, which added some parts of northern Thessaly to the Ottoman domain.

Topography. The coast waters are shallow and penetrate far into the land, deep gulfs on opposite coasts dividing the mainland into northern and central Greece and the peninsula of Peloponnesus, or the Morea. The Peloponnesus is connected with central Greece by the Isthmus of Corinth, which at its narrowest part is only 4 miles wide, and which is pierced by a ship canal. No other country in the world has so large a proportion of coast to area as Greece. It has a mile of coast for every 10 miles of surface. The country is nearly cut in two by the gulfs of Corinth and Ægina. In spite of this fact Greece is not rich in good harbors (except in a few central and highly favored parts of the country), owing to a wall of mountains which rises from the shore on long stretches of the coasts. Though the east coast has many fine ports, the harborless shores include the entire east sides of Thessaly and of the long island of Eubœa, and the east side of the Peloponnesus, south of the Gulf of Argolis to the most southern rock mass of Cape Malia. Volo, on the gulf of that name, is the only port of Thessaly. The accession of Saloniki surrounding the Gulf of Saloniki gives Greece a northern seaport. The best harbor facilities are found in the beautiful Gulf of Ægina, where the fine natural harbor of the Piræus is the port of Athens, 6 miles inland. Still farther south the shores of the Gulf of Argolis, penetrating deeply into the Peloponnesus, are rich in harbors. The gulfs of Ægina and Argolis have always been the centre of Greek sea life; and the Gulf of Ægina contributed in no small measure to the influences that made Athens the centre of Greek culture. The south coast of the Peloponnesus is deeply indented by the Laconian Gulf (Gulf of Marathonisi, or Kolo-Kythia) and the Messenian Gulf (Gulf of Koroni). The west coast of the Peloponnesus is flat, low, and but little indented, while the north coast, washed by the waters of the Gulf of Corinth and its entrance, the Gulf of Patras, is high and steep, with a good harbor at Patras near fertile and highly cultivated plains. The west coast north of the Gulf of Patras is swampy in the south, high and mountainous in the north, but of small importance in the sea trade.

In its surface forms Greece preserves the characteristic aspects of the broader mass of the Balkan Peninsula (q.v.) to the north of it. It is preëminently a mountain land, the ranges of the Balkan Peninsula extending into and through the country. The wild chain of the Pindus, which extends from the Albanian frontier southeast to the head of the Gulf of Corinth, a dominating feature, forms the water parting and sharply divides the western from the eastern part of Greece. West of the Pindus the ranges of the Dinaric mountain system, which parallels the shores of the Adriatic farther north, pass through Greece to the south end of the Peloponnesus. These chains are crowded so closely together that the valleys are very narrow, and there is little development of high mountain plains. The mountain chains of eastern Greece, on the other hand, are broadly distinguished from those of the west by the fact that their main direction is east and west. On the whole, the mountains are of only medium elevation, though Parnassus, the best-known summit of the eastern ranges, rises in the very heart of Greece to a height of 8070 feet; and Mount Taygetus, the culminating point of the Dinaric system in the Peloponnesus, is 7903 feet high.

The chains, frequently connected with one another by spurs, make a network of mountains throughout the country. The result is that Greece has no great middle point upon which its highways and activities converge. It is divided into a large number of small districts which are reached with difficulty over the mountain roads. The great bond of union is the sea,


GREECE
SCALE OF MILES
0 10 20 40 60 80 100
ATHENS and PIRÆUS
MILES
Walls of Ancient Athens
Daphni
Daphni Mt.
Zlegen Mt.
Hirten Mt.
Feld Mt.
Piræus
Bay of Phaleron
Athens
Acropolis
Museum
Royal Palace
Sepolia
Patesia
Turko-Bunion
Kolokythu
Pachy
Lykabettos
Longitude E East 21 from F Greenwich
L.L.POATES ENGR'G CO., N.Y.
A B C D E F G H J
1 2 3 4 5 6 7 8 9
20 22 24 26
42 40 38 36
North Albanian Mts.
Durazzo
Scutari
G. of Drino
Vlora
Avlona
Corfu
Paxo
Antipaxo
Santa Maura
Cephalonia
Zante
Strivali Is.
Ionian Sea
Janina
Epirus
Arta
Preveza
Acarnania
Aetolia
Phthiotis
Eubœa
Bœotia
Attica
Athens
Achaia
Elis
Corinthia
Argolis
Arcadia
Triphylia
Messenia
Laconia
Lacedæmon
Kalamata
Sparta
Cerigo
Cythera
C. Matapan
C. Malea
Gulf of Corinth
G. of Ægina
Gulf of Salonika
Salonika
Chalcis
Macedonia
Servia
Bulgaria
Rhodope Mts.
Thessaly
Larissa
Volo
Trikhala
Arta-Trikhala
Olympus
Mount Athos
Thasos
Samothraki
Imbros
Lemnos
Tenedos
Gulf of Enos
G. of Saros
Adrianople
Rodosto
Turkey
Mitylene or Lesbos
Chios
Samos
Nikaria
Patmos
Northern Sporades
Skyros
Skopelos
Andros
Tinos
Syra
Mykoni
Naxos
Paros
Siphanto
Milo
Nio
Amorgos
Santorin
Anaphi
Astropalia
Kalimno
Kos
Karpathos
Kaxo
Occupied by Italy
Ægean Sea
Sea of Candia
Crete
Canea
Candia
Mediterranean Sea

whose deep bays and gulfs serve the trade of the interior. Greece is rich in contrasts of color and in picturesque beauty; and the charm of its landscapes is especially emphasized along the coastal indentations where the glowing colors of the bare mountain walls contrast with the deep blue of the sea between them. While there are many small plains among the highlands, the only great plains are those of Thessaly in eastern Greece. They are surrounded by mountains and nowhere reach the sea; comparatively level and woodless, but covered with alluvium, they are very fertile, the granary of the kingdom, the region where landscapes are most smiling and vegetation is most luxuriant. The Thessalian plains are separated by highlands extending northwest and southeast about midway between Larissa and Trikala. There are many small fertile plains in Bœotia, Messenia, Argolis, and along parts of the coast. Macedonia, including Saloniki and Monastir, the extreme north of Greece, contains many fertile hill-girdled plains, yielding grain, tobacco, and, on the coast, olives.

All the Grecian islands are mountainous. They were once a part of the mainland, and the largest island in the Ægean Sea, Eubœa, is still so regarded, as it is separated from central Greece only by the narrow Strait of Euripus, which at Chalcis is little more than 100 feet wide. Eubœa is the prolongation of the coastal mountains of Thessaly. The Grecian islands in the Ægean Sea are of small fertility, though some islands of the Cyclades, particularly Naxos and Santorini, produce excellent fruits and wine. A chain of volcanic islands bounds the Cyclades on the south; and the little group of Santorini, midway between Europe and Asia, is one of the four centres of volcanic action in Europe. The eruptions of 1866 resulted in the appearance of some new small islands. The Ionian Islands near the west coast far surpass the Cyclades in size and fruitfulness. Encircling their central mountains are hilly lands and plains of extraordinary fertility. Corfu (the ancient Corcyra) is the largest of the group, the other important islands being Santa Maura (Leukas), Cephalonia, Ithaca, Zante, and Cerigo (Cythera).

Hydrography. The rivers of South Greece are small, and none of them are important for navigation or water power. As in some other Mediterranean regions, water flows only periodically in most of the river beds, which are dry through the greater part of the year. Only the largest rivers carry water to the sea at all times. Many of the rivers are swallowed up in "sinks" in the limestone regions, reappearing far below and leaving large areas of parched lands which, if water were available, might be made very fertile by irrigation. The most important river is the Achelous, emptying into the Ionian Sea, north of the Gulf of Patras. The chief rivers of the Peloponnesus are the Alpheus and the Iri (Eurotas); of Macedonia are the Kara Su, the Vardar, and the Viztritsa rivers. During the autumn rains floods are very frequent in the rivers, nearly all of which, rising in the mountains, are torrential. Corfu is the only island that can boast of a small perennial stream, the Messongi, which is navigable for a short distance. Lakes are numerous among the mountains. One of the largest, Lake Copais in Bœotia, has been converted into a fertile plain by drainage. Some lakes have no visible outlet, but the waters are sweet; their outlets are underground conduits leading through the limestone to rivers or directly to the sea.

Climate. While the climate of the main mass of the Balkan Peninsula gradually approaches that of the Mediterranean countries, the Mediterranean subtropical climate prevails in Greece except on the higher elevations. The climate has two peculiarities. One is the extreme heat and cold occasionally recorded. The hot enervating sirocco blasts from Africa make some of the summer days almost unendurable, so that during their prevalence labor in the fields of Thessaly is carried on at night; and winds from the neighboring snow mountains of the north tend to intensify the winter cold. The other peculiarity is the contrasts in climate that neighboring localities present, due to the great diversity of the surface. While the lowlands have hot, dry summers and autumn and winter rains, the mountains are much cooler and have summer rains. There is little frost or snow in the lowlands, but the mountains are covered with snow in winter. The rainfall is considerable among the mountains of the west, while excessive droughts prevail in the east, so that many farm crops cannot be grown without irrigation. The soil is only moderately fertile except where much alluvium has overspread the rocks, as in Thessaly, where the land is very productive. The formation of humus is slow and meagre. Many slopes have been washed bare of soil by winter rains, so that much land once tilled has been abandoned.

Flora. Greece is very poor in timber, not a thirteenth part of the country being woodland; and numerous herds of goats tend to kill the young growths and prevent the rehabilitation of the forest areas, which were once far more extensive. The nature of the flora varies with altitude, three distinct zones being recognized. All the fruits and grains of the Mediterranean lands are raised from the sea level to an elevation of 1500 feet. The tree zone is mainly between 1500 and 5000 feet, the oak and beech predominating in the lower, and conifers in the higher, altitudes. There are still some fine forest areas among the mountains. Alpine conditions prevail above 5000 feet, where only a few wild plants find a foothold in the thin soil. Many of the mountains are almost bare of vegetation; and the natural vegetation on the plains only consists of grasses, scattered clumps of evergreen shrubs, and small patches of woodland.

Fauna. The bear, boar, fox, wildcat, lynx, and jackal are the most conspicuous wild animals. Several varieties of deer, hare, and rabbit, besides quails, partridges, and pheasants, are the game animals.

Geology. West Greece, including two-thirds of the mainland and nearly all the Peloponnesus, is composed of the long, parallel limestone ridges of Tertiary formation, of the Dinaric mountain system, the narrow troughs that separate them being schists and sandstone. This mountain region is a part of the Karst system which extends along the Adriatic; for, farther north, it exhibits the characteristic Karst phenomena of caverns, sink holes, and underground river channels, leaving much of the land dry and relatively barren. Some of the limestone has hardened into the purest marble. The same limestone formation built up the Ionian Islands, once a part of the mainland. The rocks of northeast Greece are of a different character, being the continuation largely of crystalline. Farther south, the eastern part of central Greece, the island of Eubœa, and the northeastern part of the Peloponnesus are covered with mountain chains of Mesozoic limestone extending in curves from west to east. The crystalline rocks of the Cyclades form the mountains, comparatively low, of these islands. Severe earthquakes often originate among the mountains. Greece is not rich in minerals, though the argentiferous lead mines of Laurion, near the southeastern extremity of Attica, yield about 16,000 tons of lead a year. There is no coal except the lignite found in Eubœa and other parts. The lack of fuel prevents the large exploitation of the copper and iron fields, though important quantities of iron and zinc ores are obtained. Paros and Pentelicus yield fine marble, and emery is obtained in Naxos and other islands. Sulphur (about 600 tons a year) is mined in Melos and Santorini. In Macedonia gold and silver were formerly mined, but the mineral resources are not properly utilized.

Agriculture. As cultivation depends largely upon irrigation, which is very unequally distributed, the tilled lands in most parts of the country resemble oases. Cereals occupy about half of the tilled lands, but wheat is among the imports, the home supply being inadequate. Rice is grown in the lowlands of Elis, and maize, barley, and oats are raised to some extent. The food requirements of the population are so far in excess of production that the imports of cereals average about 30,000,000 francs per annum. The Greek currant (a small seedless grape), grown extensively on some of the Ionian Islands and near the gulfs of Patras and Corinth, is a large crop and the staple of agricultural exports. This industry has passed through a series of vicissitudes in recent years. The falling off in production of grapes in France, due to the phylloxera, led to heavy imports of the Greek currants in a dried state, and, as a result, the production of currants in Greece doubled between 1873 and 1886, the other crops being neglected meantime. As the production of grapes in France returned to nearly normal, the demand for the Greek currants was greatly reduced, and various attempts have been made to retain the industry by the use of the surplus in manufacture of wines and spirits, a limitation of exports and in recent years a limitation of production. About 7000 acres of the currants have been uprooted in accordance with the law limiting production to a certain area and quantity, and a further reduction was still required in 1913. The vine is of first importance in Greek agriculture, the area in vineyards having increased from 125,000 acres in 1860 to 173,000 acres in 1901 and 337,000 in 1906. While currants are the chief crop, the production of wine has increased and the quality has in later times improved. Being rich in alcohol and color, Greek wines are bought by many French merchants to mix with home vintages. As the Greeks live largely on vegetables and fruits, gardening is a great industry, well-tilled areas being very numerous near the towns and on the plains. Flax, hemp, tobacco, cotton, and the mulberry tree supply the industries with raw material. The cultivation of flax and hemp has decreased on account of Russian competition, but tobacco, yielding excellent leaf, is an increasing crop, particularly on the plains of Argolis and around the Gulf of Corinth. Mulberry plantations abound in the Peloponnesus and Eubœa, where raw silk is produced, both for home industry and export. Cotton is raised in the Peloponnesus, but finds the most congenial soil and climate in Thessaly and Bœotia. During the Turkish domination olive growing steadily declined, as one method of punishing insurrection was to destroy the olive trees. Since 1830, however, the planting has rapidly advanced, and olives are to-day one of the best resources of the Greek peasantry. The trees have increased from 2,000,000 to 15,000,000 since Greece won independence, and the output of olive oil for 1911 amounted to 150,000,000 pounds. Fruit trees are important, above all in the Ionian Islands and the Ægean Archipelago, oranges, lemons, figs, and pomegranates leading in production. The most important domestic animals are sheep, of which the number is about 3,000,000, and goats, from whose milk butter and cheese are made. Goats are raised everywhere, but the large flocks of sheep are found mostly on the plains of Thessaly. Bee culture is important, and the honey of Hymettus is famous. The country abounds with fragrant flowers that give to honey a particularly delightful savor. While agriculture is the chief resource of the people, the prevailing poverty of the soil is a great drawback, and an undue proportion of the peasants are attracted from labor in the fields to the life of the sailor, and the loss of population by emigration is large. The land is largely in the hands of peasant proprietors, though there are some great estates, particularly in Thessaly. Of the total area of Greece, as it existed before the large additions made in 1912–13 as a result of the Balkan wars, there are approximately 5,200,000 acres cultivated and fallow, and 7,000,000 pasture, 2,000,000 forest, and 3,000,000 waste land. The productive power of the land depends largely upon the water supply, and a plan for the creation of hydraulic works for the drainage of certain areas and irrigation of others is under consideration. About one-half of the 58,000 acres occupied by Lake Copias has been reclaimed by drainage and is now extremely productive. The producing power of the land is limited by the custom of allowing about one-half of the arable area to lie fallow in alternating years.

Manufactures. Most of the common articles used in Greece are the product of home industry. Cloths and carpets are woven by peasant women in their houses, and the metal and leather goods industries employ thousands of men in their small shops. The poorer classes derive most of their manufactured articles from the home industries. The development of large industries is discouraged by the fact that Greece has neither coal, wood, water power, nor adequate capital. Since 1870, however, the industrial arts have made important progress, and the government does all in its power to stimulate manufacturing. The cotton cloths now produced in the factories of the Piræus and other centres supply most of the home needs and are even exported to Turkey. The Piræus is the largest industrial centre. It has a number of cotton, silk, and wool factories, many flour mills; it builds ships and makes alimentary pastes. The number of factories in the neighborhood of the Piræus is now over 100. Larissa is also prominent in the cotton and silk industries. Sparta and Athens weave cheap silks, and Patras spins much cotton yarn. The metallurgic industries are little developed, though some machinery is made at Syra and a few other towns. The principal industries are those which transform agricultural and animal products into manufactured commodities, such as soap works, tanneries, powder and dynamite factories, distilleries, and refineries. Sponge fisheries are actively carried on in the Ægean Sea and along the coasts of Tunis and Tripoli, and the preparation of sponges for market is a considerable industry. As the sea trade is largely developed, ships are built in all the ports, the industry being most active in Syra and the Piræus.

Commerce. The following figures show the average volume of the special trade of Greece (i.e., the commerce exclusive of the forwarding trade):

	1879–83	1891–95	1905	1912
Imports	$24,500,000	$22,500,000	$25,740,000	$30,793,000
Exports	13,500,000	17,000,000	16,268,000	28,987,000

The chief imports in 1911 were: agricultural products, chiefly wheat, $10,850,000; cotton, wool, and other fabrics, $3,950,000; forest products, $2,410,000; manufactures of metals and minerals, $5,100,000; drugs and chemicals, $1,600,000; live stock, $601,000; animal products, $1,102,000; and fish, $1,506,000. Currants are about one-fourth of the exports. The chief exports in 1911 were: agricultural products, mostly currants, $14,102,000; raw metals and minerals, $4,601,000; manufactures of metals and minerals, $151,000; wine and spirits, $3,498,600; oil, etc., $1,672,000; animal products, $1,009,000; and forest products, $741,000. Great Britain has the larger part both of the import and export trade, usually selling to Greece about one-fourth of her purchases (woven goods and yarns, coal, iron, and machinery), and buying from her about one-fourth of her sales (mainly currants, besides lead, iron, zinc and silver ores, raisins, sponges, and valonia). The convenient communications between South Russian and Greek ports give Russia an equal place with Great Britain in the value of the imports, most of the merchandise drawn from Russia being foodstuffs and petroleum; Austria-Hungary, Turkey, Egypt, Germany, France, and Italy are the other important buyers and sellers. According to the official returns of the United States, which differ materially from those of Greece, the exports to Greece in 1913–14 were $1,216,295, and the imports from Greece $3,179,618.

Banks. The Ionian Bank, established in 1839, with headquarters in London, and the National Bank, dating from 1841, with which was incorporated the Epiro-Thessalian Bank in 1900, are the chief institutions of their kind in the country; they issue notes. There are numerous private banks, and since 1899 an agricultural bank has been in operation at Patras with the object of freeing agriculturists from usurious money lenders. The currency of the country is officially stated in 1912 at 5,000,000 drachmas (drachma, 19.3 cents) gold; 3,000,000 silver; and 20,800,000 uncovered paper. Greece entered the Latin Monetary Union in 1868, and her standard coin, the drachma, became equivalent to the franc in value.

Transportation. As the sea is the main highway, both in the domestic and foreign trade, the completion of the Corinth Canal across the Isthmus of Corinth, in 1893, was a most important addition to commercial facilities. This canal, 4 miles long, connects the Ionian and Ægean seas and gives a much shorter and smoother passage between Italy and Odessa and for all the small vessels plying between the ports of north and central Greece than that around the south end of the country. The narrowness of the canal, the strength of the current passing through it, and the high tolls charged on foreign vessels have prevented its use to the extent expected, especially by the vessels of other nationalities. In 1912 the Greek merchant marine consisted of 379 steamers of 690,573 tons, and 811 sailing vessels of 145,284 tons. More than half the trade is carried through the port of Piræus. The Greek flag is more prominent than any other in the shipping trade of the eastern Mediterranean ports, and there are several thousands of small trading craft. The islands are the great centre of sea life. The little island of Syra, in the centre of the Cyclades, has long been the largest trader in the Ægean, though its importance has for some time been declining. A large part of the shipping of Greece belongs to the Ionian Islands. In 1910, 2741 vessels of 3,762,000 tons entered, and 3005 vessels of 4,100,000 tons cleared at the port of Piræus, which has about three-fifths of the total shipping of Greece. The railroads are as yet very inadequate for the needs of the country, only 850 miles having been in operation in 1911. The railroad northward from Piræus has been completed to the Turkish border with the purpose of connecting with the railway lines of that country; but the Turkish government long refused its assent, and in 1913 plans were entered upon for linking up the Piræus-Larissa Railway with the European system by way of lines in Macedonia, and thus bringing Greece into rail communication with the rest of Europe.

Government. Greece is a constitutional monarchy, the sovereign being entitled "King of the Hellenes." The reigning King (1914) is Constantine I (q.v.), born Aug. 2, 1868; ascended the throne, March 18, 1913, on the assassination of his father George I, who had occupied the throne since 1863. The legislative power is vested in a Chamber of Deputies (the Boule), which meets annually in Athens, the 235 members being elected by popular vote for a term of four years. The suffrage is restricted to males, 21 years old or over. Members of the Boule, and all officials, must be at least 30 years of age. There is also a body designated the Council of State, which has certain veto powers over the decisions and acts found to be contrary to law. The executive functions of the state are in the hands of the six heads of departments, who compose the ministry.

Defense. Military service is compulsory for 2 years in the active army, and for 11 years in the first reserve and 9 years in the second, followed by 7 years in the national guard. The army on a peace footing numbered in 1911 about 25,000, and on a war footing about 85,000. This will, however, be materially increased as a result of the large additions to the area and population of Greece which followed the Balkan wars in 1912–13. A royal decree in August, 1913, directed a reorganization in a manner which would create six army corps, to consist at first of two divisions, each division to include three infantry and one artillery regiments, one battalion of cavalry, a company of sappers, and the usual departmental troops. Later the number of divisions in each army corps is to be increased to three. It is estimated that the new system will at the end of 21 years give an available military force of over 400,000 men. The navy, reorganized in 1906 and subsequently strengthened, included in 1912–13 4 ironclads, 1 modern cruiser, 14 destroyers, 13 torpedo boats, and 2 submarines, and this was further strengthened in 1914 by the purchase from the United States of two battleships of about 15,000 tons' displacement, at a price of $12,500,000 for both vessels. The navy is to be further reorganized under the advice of British officers. See NAVIES.

Finance. The average annual revenue was approximately $26,000,000 in 1912, of which about one-half was from duties and excise, the remainder from monopolies, direct taxes, stamps, and miscellaneous. This will be greatly increased by the additions to area and population noted elsewhere. The debt in 1912 was $207,000,000. The monetary unit is the drachma, equivalent to the franc. The gold coins of the leading countries are accepted, by royal decree, as legal tender. The metric system of weights and measures was introduced in 1898.

Population and People. The population of Greece was shown by the census of 1907 to be 2,632,000 and estimated at 2,666,000 in 1909. This was, however, greatly increased by the additions of territory as a result of the Balkan wars (q.v.) in 1912–13. The increase of area, amounting to about 80 per cent, caused an equal percentage of increase in the population. With this addition the population was estimated in 1914 to be 4,363,000. These additions to area were chiefly from Macedonia, Epirus, Crete, and other islands, and the population absorbed was largely of Greek stock. There are about 3,000,000 Greeks in Asia Minor, nearly 1,000,000 in European Turkey, about 500,000 in the Ottoman islands, Cyprus, and Crete, and considerable numbers in other parts of the Old World, while about 300,000 have come to the United States. There are also many in Egypt and in the various European countries. Over 200,000 non-Greeks reside in Greece, of whom the Albanians, the most numerous body, are becoming largely assimilated with the native population. The Greeks surpass all the other peoples of the Balkan Peninsula in homogeneity and national unity, and in this way, as well as in commerce and navigation, have shown themselves to be worthy successors of the old Hellenes in spite of the misrule and other misfortunes which for centuries tended to impoverish the soil and decimate the population. Most of the people, as well as their government, are poor. It is foreign capital that has to a large extent made public improvements and brought about some development in manufacturing.

Ethnology. In racial characteristics the Greeks belong to the Mediterranean race and are akin to the Iberian of Spain and the Ligurian of Italy. They are above the average in height (1.65 millimeters, or 5 feet, 6 inches), dolichocephalic (index 75.7 to 83 according to mixture), with dark skin, hair, and eyes. The face is a long oval, and the features are most attractive. Where those of shorter skulls or lighter color have crept in, the effect is seen in the population. Slavs, Avars, Turks (Ural-Altaic), and Albanians (Adriatic or Dinaric race) have invaded Greece and added their racial characters to those of the older population. The Greeks of classic times were of the long-headed Mediterranean type, as the crania that have been recovered show, though their statuary, as is pointed out by Stephanos, is brachycephalic. In speaking of the ancient inhabitants two names stand out prominently for recognition, that of the Hellenes and that of the Pelasgians. Relying chiefly on the testimony of Herodotus, Sergi places the Pelasgians in the great Mediterranean family, where, before Greece was Hellenized, they completed the circle formed else by Iberians, Ligurians, and Libyans. This aboriginal Pelasgian stock was Hellenized afterward, just as the inhabitants of Gaul and Spain were Latinized. Behind the classic age lay the age of bronze and the age of stone. But the scarcity of osteological material renders it impossible to form opinions on the race of the men who peopled them.

In Ætolia, Acarnania, Thessaly, the greater part of the Peloponnesus, and most of the islands, the descendants of the old Greeks are still predominant; but a very large admixture of Albanians (see ALBANIA) prevails in Attica, Bœotia, Phocis, and Argolis, with the islands of Spezzia, Salamis, Hydra, and Andros. The true Greek is easily recognized by his tall stature, slim body, aquiline nose, oval face, and mustache, the beard being worn only in mourning. The Greeks are temperate in both eating and drinking; flesh is seldom eaten, so that the diet is principally vegetable. The Greeks are devotedly attached to their fatherland, and their love of liberty and independence is strong. Though they are loyal to a good ruler, they are easily roused to resistance by the infringement of their rights. Commercial bargains are the delight of the Greeks. Early marriages are common, and the Greek matrons take pride in large families. Two peculiar branches of the Greek race are the Mainotes of the Peloponnesus and the Palikars of the northern highlands. The former, who boast to be the descendants of the ancient Spartans, inhabit principally the mountain fastnesses of Taygetus, where for centuries they defied the power of the Turks. In recent times education, intermixture with other races, and commerce have to a great extent removed their distinctive peculiarities. The red cap, the white shirt, and the golden jacket mark out the Palikars even to the casual observer as a separate class. They go about armed and attended by armed followers; their houses are fortresses, and their servants form a little army. The islanders are almost all seamen or traders; they wear the red cap, a short jacket, and wide Turkish trousers. The Albanians are a strong, hardy race, and engage in agriculture or other severe labor. The Wallachs, of whom there are a considerable number in the region of the Pendus, are a nomad and pastoral race; they sleep on the hillsides with their flocks, which are guarded by ferocious dogs. There are large numbers of Maltese at Athens, and especially the Piræus. The settlers from west Europe are not numerous. There is a considerable Turkish element in Thessaly.

Religion. The predominant religious faith is Orthodox Greek, which is the state religion, though the fullest liberty is given to all sects. The ecclesiastical authority of the Greek church is no longer vested in the Patriarch at Constantinople, but in a council known as the Holy Synod, under the presidency of the Metropolitan of Athens. The Christian sects, other than

Greek, number about 25,000; Jews, 5000; and Mohammedans, 20,000. See Greek Religion (ancient); Greek Church.

Education. During the fifth and fourth centuries B.C. the education of the Greek boy was divided into three branches: (1) gymnastics (γυμναστική), including all forms of physical training, wrestling, running, leaping, etc., taught by a trainer (παιδοτρίβης), at a *palæstra.* (2) grammar (γραμματική), including reading, writing, and the elements of numbers—in this school the boy learned by heart many of the ancient poets and studied carefully their works; (3) music (μουσική), an essential part of a Greek liberal education, including singing and playing on the lyre. This training lasted from about the sixth to the eighteenth year. Further training in philosophy and rhetoric was in the hands of the Sophists (q.v.). The boy was accompanied to and from school, and in his exercise, by a pedagogue, who was not a teacher, but merely a slave, who had general oversight over the boy and could punish him if necessary. In later times other branches, notably geometry, were added to the usual training, and in some places schools were provided by the city for boys and even girls. For the education of the youth by the state, see Ephebus.

In modern days education from the humblest school to the university is free to all. In the rural districts, however, the law requiring all children to attend school is not well enforced. Education is upon a somewhat higher plane among the islands than on the mainland. The school system is only partly supported by the government, being largely dependent upon private contributions. Fifteen per cent of the army recruits can only read, and 30 per cent are totally illiterate. The University of Athens, with 3500 students in 1912, attracts over 800 students from Turkey and other Mediterranean countries, chiefly from Turkey. There are also a polytechnic and two agricultural schools, a military academy, and several naval schools.

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HISTORY

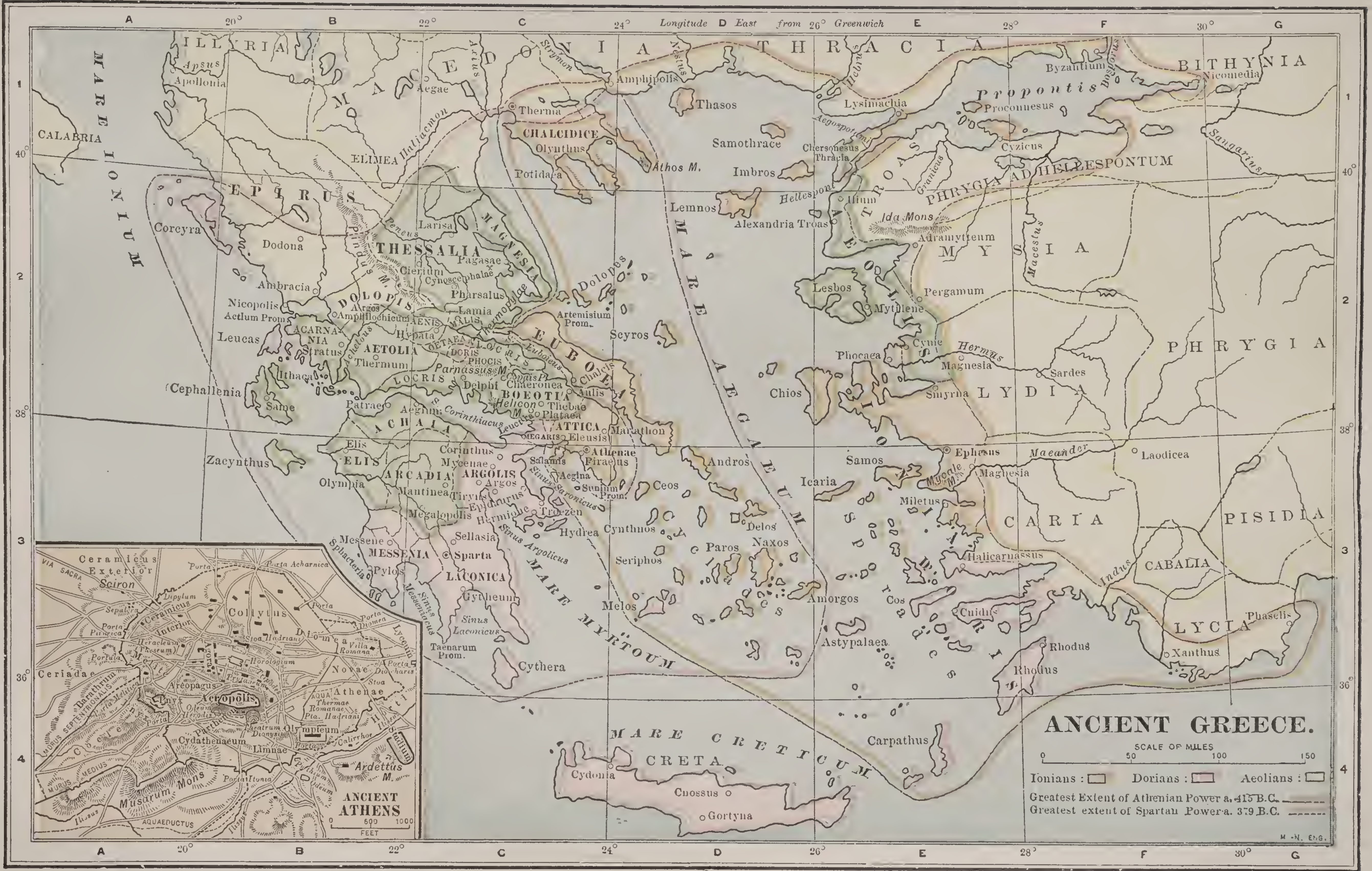
Ancient History. (See paragraph in this article under *Ethnology.*) The Hellenes, or later inhabitants of Greece, were a branch of the Indo-European, also called Indo-Germanic or Aryan, speech family. (See Greek Language.) They are supposed to have entered the country at a remote period from the north and the northeast in successive waves of migration and were composed of various independent tribes. It was not until after the time of Homer that they received the common name "Hellenes" (q.v.). By Homer they are called Danaäns, Argives, and Achæans, while the Hellenes were in his time a small tribe in Thessaly. The name "Greeks" was another tribal name, generalized by the Italians. The early history of the Greeks is one of fable, wherein the achievements of centuries are compressed into single generations, and the movements of whole peoples are described as the adventures of heroes. To this so-called Heroic age belong the deeds associated with such names as Heracles (see Hercules), Theseus, and Perseus, and the great undertakings known as the Argonautic Expedition (see Argonauts), the Expedition of the Seven against Thebes (q.v.), and the Siege of Troy (q.v.). Much light is thrown upon the civilization of the earliest period by the remains found in Crete, at Mycenæ, Tiryns, and many other places. See the full discussion under Archæology, II, *Minoan,* or, *Ægean, Period,* and III, *Mycenæan Period.*—In the paragraphs that follow the reader may largely supplement the information there given by referring to the articles on the several countries, cities, men, and institutions (such as *boule, ecclesia*) there mentioned.

The first truly historical landmark in the history of Greece is offered by the so-called Dorian migration. (See Dorians; Heraclidæ.) The waves of migration which as early as the Stone age had peopled Greece with the tribes from the north were continued from time to time after the country had been occupied. One such wave was that of the Dorians, who, at some time roughly placed between 1200 and 1000 B.C., descending from their mountainous home in the central part of northern Greece, overran the Peloponnesus and enslaved or drove out the former inhabitants of the land. One of these displaced tribes, the Achæans (see Achæa; Achæans), settled on the southern shore of the Corinthian Gulf, expelling the Ionians, who took refuge in Attica. (See Ionia.) The story of these migrations is compressed into a single generation, but it doubtless represents the conquests of at least two or three centuries. One of the effects of the movement was the colonization by Greeks of the lands farther east —the islands of the Ægean Sea and the coast of Asia Minor. The expelled peoples were obliged to seek new homes, and three important streams of colonization poured across the sea: the Æolians (q.v.), so called, who settled the islands and the coastland to the north; the Ionians, who settled the islands of the central Ægean and the middle portion of the Asiatic coast; and the Dorians, farther south, who occupied Crete and other islands and the southwestern coast of Asia Minor. Several centuries later, in the eighth and seventh centuries B.C., another great colonizing impulse spread through the Grecian lands; the cause of this impulse, however, was not external pressure, but internal expansion. This movement carried Greek civilization to Sicily, south Italy (Magna Græcia), Africa, and other regions.

The history of Greece is for the most part one of individual states, each fired with the spirit of independence and the desire for freedom, and each seeking to solve the problem of national development in its own way and according to its own impulses. In one work Aristotle (q.v.) described the constitutions of 158 Greek states! The two states which became most prominent, and with which history has principally to do, are Athens (q.v.) and Sparta (q.v.). Sparta from early times held the lead in the Peloponnesus, where Argos was long her rival. In the seventh century B.C. she subdued Messenia (q.v.). Her peculiar political and social institutions are ascribed to the lawgiver Lycurgus, who, according to the common tradition, lived in the ninth century B.C. At the head of the government were two hereditary kings; but their power was limited, and in historical times was confined to certain priestly functions, the command of the army in war and the enjoyment of a position of honorary distinction in the state. The actual power was vested in the ephori (q.v.).

The development of the Athenian political system was carried further than that of the Spartan system. The regular course of political history in the Greek states was this: The kingly form of government, which was prevalent in the Heroic age, gave place at a later time to an oligarchy based on birth; this in turn became transformed into a one-man power, or "tyranny," unconstitutional or extraconstitutional; and the "tyranny" was finally replaced by a government of the people, or democracy. The history of Athens illustrates this course of development, and the names of Solon (archon, 594 B.C.), Clisthenes (about 508 B.C.), and Pericles (in the latter half of the fifth century B.C.) are landmarks in the development of the Athenian democracy. Pisistratus and his sons (560–510 B.C.) mark the period of "tyranny." The chief officers and bodies of the Athenian democracy were the nine archons, the Areopagus, the Senate, the Ecclesia, or public assembly, and the Heliæa, or law courts. By the side of Athens, Sparta, and Argos, Corinth early rose to prominence, developing into a great industrial, commercial, and colonizing centre. On the constitution of the Greek states, consult: Gilbert, *The Constitutional Antiquities of Athens and Sparta* (Eng. trans., London, 1895); Gardner and Jevons, *A Manual of Greek Antiquities* (2d ed., ib., 1898); Whibley, *A Companion to Greek Studies* (Cambridge, 1905); Busolt, *Die griechischen Staats- und Rechtsaltertümer* (2d ed., Munich, 1892); Greenidge, *Handbook of Greek Constitutional History* (London, 1896).

The Greek settlements in Asia Minor were conquered by Crœsus, King of Lydia, in the early part of his reign (560–546 B.C.), and brought within the Lydian Kingdom. In 546 Crœsus was overthrown by Cyrus the Great, King of Persia, and the Greek cities in Asia, as well as the islands along the coast, with the exception of Samos, were made subject to the Persians. In 500 B.C. the Ionians revolted against the Persian rule and were assisted by 20 Athenian and five Eretrian ships; Sardis, the capital of Lydia, was taken, sacked, and burned. The ire of Darius, the Persian king, was aroused, and he vowed vengeance both on his revolted subjects and on their supporters from across the sea. In 493 B.C. the rebellion was brought to an end by the subjection of the Ionians (q.v.), and in the following year Mardonius, son-in-law of Darius, was sent to Greece to take vengeance on the Athenians and the Eretrians. Three hundred ships and 20,000 men were lost in a storm off Mount Athos, and Mardonius himself, who led an army by land, was so harassed by the tribes of Thrace that he was obliged to turn back. Two years later, in 490 B.C., a second expedition, consisting, according to ancient authorities, of 600 galleys, 100,000 foot and 10,000 horse, was sent across the Ægean, under the command of Datis and Artaphernes. After taking the city of Eretria the Persians proceeded, under the guidance of the aged Hippias, son of Pisistratus, to the plain of Marathon, 22 miles northeast of Athens. In the battle which there took place, 10,000 Athenians were assisted by 1000 heavy-armed soldiers and a few light-armed troops from Platæa. A messenger had been sent for aid to Sparta, but, from a religious superstition, the Spartans were prevented from marching for five days, and the crisis was then past. The Greeks, led by Miltiades, were overwhelmingly victorious; 6400 Persians were lost, while only 192 Athenians were killed. (For an elaborate discussion of this battle, consult Macan's edition of Herodotus, 4 vols., London, 1895–1908, and How and Wells, *Herodotus*, vol. ii, Oxford, 1912.) In the following year Athens found herself at war with Ægina. This war taught her the necessity of having a navy, and she was induced by Themistocles to construct a fleet of 200 vessels and to add 20 new vessels thereto every year. In the meantime Xerxes, the Persian king, was preparing for an invasion of Greece on a grand scale. Troops and supplies were brought together from every quarter of his Empire, until the largest army of which history has a record was assembled. A bridge of boats was thrown across the Hellespont for the convenience of the land troops, a canal was cut through the neck of the peninsula of Athos for the passage of the ships, and in the spring of 480 B.C. the force was set in motion. The first stand was made by the Greeks at Thermopylæ. The pass was heroically defended by Leonidas and his 300 Spartans, but was finally taken through the treachery of a Greek, who pointed out to the Persians a path by which they were enabled to enter the pass from the rear of the Spartans and to destroy them between two fires. Athens was captured and burned, having been, at the approach of the Persians, abandoned by its inhabitants. In the meantime the Persian fleet,


ANCIENT GREECE.
SCALE OF MILES
0
50
100
150
Ionians : ☐
Dorians : ☐
Aeolians : ☐
Greatest Extent of Athenian Power a. 415 B.C.
Greatest extent of Spartan Power a. 379 B.C.
M.-N. ENG.
Longitude D East from 26° Greenwich
A
B
C
D
E
F
G
1
2
3
4
20°
22°
24°
26°
28°
30°
36°
38°
40°
MARE IONIUM
CALABRIA
ILLYRIA
Apsus
Apollonia
MACEDONIA
Aegae
Axius
Haliacmon
ELIMEA
Therma
Strymon
Amphipolis
Nestus
CHALCIDICE
Olynthus
Potidaea
Athos M.
THRACIA
Hebrus
Thasos
Samothrace
Imbros
Lemnos
Lysimachia
Aegospotami
Chersonesus Thracia
Hellespont
Propontis
Bosporus
Byzantium
Proconnesus
Cyzicus
BITHYNIA
Nicomedia
Sangarius
PHRYGIA AD HELLESPONTUM
TROAS
Granicus
Ilium
Ida Mons
Alexandria Troas
Adramytteum
AEOLIS
MYSIA
Macestus
Lesbos
Mytilene
Pergamum
Cyme
Hermus
Phocaea
Magnesia
Sardes
Smyrna
LYDIA
PHRYGIA
Chios
IONIA
Samos
Ephesus
Maeander
Mycale M.
Laodicea
Icaria
Miletus
CARIA
PISIDIA
Halicarnassus
Indus
CABALIA
LYCIA
Phaselis
Xanthus
Cnidus
Cos
DORIS
Rhodus
Carpathus
Astypalaea
Amorgos
SPORADES
Naxos
Paros
Delos
CYCLADES
Andros
Ceos
Cynthnos
Seriphos
Melos
MARE AEGAEUM
MARE MYRTOUM
MARE CRETICUM
CRETA
Cydonia
Cnossus
Gortyna
Cythera
Dolopes
Scyros
Artemisium Prom.
EUBOEA
Sinus Euboicus
Chalcis
Aulis
Marathon
ATTICA
Eleusis
MEGARIS
Athenae
Piraeus
Salamis
Aegina
Sinus Saronicus
Sunium Prom.
Hydrea
Troezen
Hermione
Epidaurus
Tiryns
Argos
ARGOLIS
Mycenae
Corinthus
Sinus Argolicus
Sellasia
Sparta
LACONICA
Gytheum
Sinus Laconicus
Taenarum Prom.
Sinus Messeniacus
MESSENIA
Pylos
Sphacteria
Messene
Megalopolis
Mantinea
ARCADIA
ELIS
Elis
Olympia
ACHAIA
Aegium
Patrae
Sinus Corinthiacus
Leuctra
BOEOTIA
Helicon M.
Thebae
Plataea
Chaeronea
Copais P.
PHOCIS
Delphi
Parnassus M.
DORIS
LOCRIS
OETAEA
MALIS
AENIS
Thermopylae
Lamia
Hypata
AETOLIA
Thermum
Achelous
ACARNANIA
Stratus
DOLOPIS
Argos Amphilochicum
Ambracia
Nicopolis
Actium Prom.
Leucas
Ithaca
Cephallenia
Same
Zacynthus
EPIRUS
Dodona
Corcyra
THESSALIA
Peneus
Pindus M.
Larisa
Pagasae
Cierium
Cynoscephalae
Pharsalus
MAGNESIA
ANCIENT ATHENS
0
500
1000
FEET
Ceramicus Exterior
VIA SACRA
Sciron
Dipylum
Porta Acharnica
Porta
Collytus
Ceramicus Interior
Sepulcra
Porta Piraeica
Heracleum
Theseum
Stoa Hadriani
Diomea
Villa Romana
Porta Diomea
Lyceum
Horologium
Porta Diocharis
Stoa
Novae Athenae
Aqua Thermae Romanae
Pta. Hadriani
Ceriadae
Barathrum
Muri Septentrionales
Pnyx
Areopagus
Acropolis
Odeum Herodis
Theatrum Dionysi
Olympieum
Callirrhoe
Stadium
Cydathenaeum
Limnae
Ardettus M.
Murus Medius
Musarum Mons
Porta Itonia
Odeum
Ilissus
AQUAEDUCTUS

after undergoing severe losses in storms and in battle at Artemisium, off the northern end of the island of Eubœa, proceeded to Salamis in pursuit of the Greek fleet. The number of the Persian vessels at Salamis was about 1200; that of the Greeks less than 400, 200 of which were Athenian. In the battle which took place in the narrow strait between the island and the mainland, and which Xerxes viewed from a golden throne erected on the slope of Mount Ægaleus, on the mainland west of Athens, the Persians were completely defeated. Xerxes fled in alarm to Asia, leaving Mardonius to bring the war to a close. In the following year (479 B.C.) Mardonius was overwhelmed by the Greeks, under Pausanias, at Platæa and slain, and on the same day another Persian army was defeated, with loss of its fleet, at Mycale in Asia.

Athens was now, as a result of her patriotism and sacrifices, the first state in Greece, and her position was further strengthened by the events that followed the Persian wars. The treachery of Pausanias, the commander in chief of the combined Athenian and Spartan fleet which was engaged in driving the Persians from the Greek cities in the Ægean and in the neighborhood of the Hellespont, caused the fleet to put itself under the leadership of the Athenian commanders, and in 478 B.C. was formed the Confederacy of Delos, or Delian League, on which the future empire of Athens was to be built. This confederacy was at first a voluntary coalition of Greek states formed for the purpose of prosecuting the war with Persia and driving the Persian power from the Ægean Sea and the lands washed thereby. The delegates were to meet yearly on the island of Delos, and there was also to be the treasury. A fixed contribution in ships or money was assessed on each state. Gradual changes were, as time went on, wrought in the relation of the allies to one another, and the alliance of equal independent members was at length transformed into an empire of dependent states, with Athens at the head.

The period between 479 and 431 B.C., the year of the beginning of the Peloponnesian War, was the most brilliant in the history of Athens. The latter part of this period, called the age of Pericles, saw the complete democratization of the Athenian constitution. The Long Walls (q.v.), connecting Athens with the port of Piræus, were now built, the city was beautified with many public buildings, the Propylæa, the Parthenon, the so-called Theseum, and others, and sculpture, art, and literature flourished. (See GREEK ART, II, *Attic Period.*) But irritation at the oppression of Athenian control, and the old spirit of independence, which always stood in the way of Greek unity, were silently at work; the height of Athenian power is marked by the battle of Œnophyta (456 B.C.) and the conquest of Bœotia; in 447 B.C. Bœotia revolted, and the Athenians were defeated at Coronea. By the treaty which was then made the Athenians engaged not to interfere further in Bœotian affairs, and, by the Thirty Years' Truce, concluded two years later (445 B.C.), they acknowledged the leadership of Sparta in all Peloponnesian matters.

The situation of affairs in Greece at the time of which we are speaking was as follows: On one side was Athens, with her empire of subject and mostly discontented allies, comprising all the coast cities of Asia Minor as far south as Lycia, the cities along the Thracian and the Chalcidian shores, and nearly all the islands of the Ægean; and on the other, Sparta, with her voluntary confederacy of free and independent states, among which were numbered nearly all the states of the Peloponnesus, some in northern Greece, and those of Italy and Sicily. Athens was a maritime power, with an efficient navy of 300 galleys; Sparta was preëminently a land power. Athens had a full treasury and a large annual revenue; Sparta was financially weak. Athens was democratic and progressive; Sparta was aristocratic and conservative. It was inevitable that the question of supremacy should at some time come to an issue between these two. The struggle was precipitated by the contentions between Corinth and her colony Corcyra, and the revolt of Potidæa from the Delian League. The war which now broke out in 431 B.C., which is known as the Peloponnesian War, lasted until 404 B.C., and resulted in the complete abasement of Athenian pride and the establishment of Spartan supremacy. It may be divided into three periods: (1) from the beginning to the Peace of Nicias (421 B.C.); (2) from the Peace of Nicias to the Sicilian expedition (415 B.C.: see ALCIBIADES; SICILY; SYRACUSE); (3) from the Sicilian expedition to the end (404 B.C.). The most important events of the first period were the surprise of Platæa by the Thebans (431 B.C.), the fall of Mitylene (427 B.C.), the capture of Platæa by the Spartans (427 B.C.), the siege and capture of Sphacteria by the Athenians (425 B.C.), and the defeat of the Athenians by the Spartans at Amphipolis (422 B.C.). The Peace of Nicias, which was a peace in name but not in fact, left the two contending parties in practically the same relative position as before the war. In the second period there was more or less fighting between the different states of Greece, but no great battle. The ill-advised Sicilian expedition (415–413 B.C.) portended the ultimate result of the long contest; it left Athens broken and exhausted. The battle at Arginusæ (406 B.C.) was an Athenian victory, but the capture of the Athenian ships at Ægospotami in 405 B.C. put an end to the war. Athens surrendered to the Spartan commander, Lysander, her walls were demolished, her ships were given up, she was deprived of her foreign possessions, and an oligarchical government was established in the city.

The body which was now set up at Athens consisted of 30 members and was known as the Thirty Tyrants. Similar bodies of 10 were everywhere established by Lysander in the democratically ruled cities of Asia Minor and the islands. It soon became apparent, to those who had chafed under Athenian rule, that the rule of Sparta was destined to be much more harsh and oppressive than that of Athens had been. A change of feeling took place in many quarters. The Athenian exiles, joining under the lead of Thrasybulus, seized the fort of Phyle, a few miles north of Athens, entered the Piræus, defeated in battle the forces of the Thirty, and secured the deposition of the Thirty and the appointment of a Council of Ten in their stead. These were later replaced by another board of 10, and a reconciliation was effected. The democracy was restored (403 B.C.) 16 months after Lysander had taken Athens.

The period of Spartan supremacy extended from the close of the Peloponnesian War to the battle of Leuctra, in 371 B.C. In 399 B.C. war broke out between Sparta and Persia, and in 397 B.C. Agesilaus, the King of Sparta, was sent to Asia to bring it to an end. He met with success and was about to carry the war into the interior of Asia, when he was called home to oppose a coalition of Greek states which had been formed against Sparta. The struggle that ensued is known as the Corinthian War. In 395 B.C. Lysander, in command of a Spartan army, was defeated and slain by the Thebans at Haliartus. The allies were defeated by Agesilaus at Coronea in 394 B.C., but in the same year the Lacedæmonian fleet was defeated by Conon and Pharnabazus at Cnidus. Conon, returning to Athens, restored the fortifications of the Piræus and the Long Walls. The Corinthian War was continued in a petty way, and with varying fortune, until in 387 B.C. Sparta, with the aid of Persia, imposed upon the Grecian states the disgraceful Peace of Antalcidas (q.v.), in which the interests of the Asiatic Greeks were sacrificed. Five years later, in 382 B.C., Sparta treacherously seized the citadel of Thebes and overcame the Chalcidian city of Olynthus. Thebes was soon freed again by the Theban patriot Pelopidas, and fighting was resumed between Athens, supporting Thebes, and Sparta, which was concluded in 371 B.C. by the Peace of Callias. Thebes refused to sign the treaty, and the Spartans invaded Bœotia. The issue was determined by the battle of Leuctra (371 B.C.), in which the Thebans, led by Epaminondas, thoroughly defeated the Spartans.

The period of Theban supremacy, which now began, lasted nearly 10 years, to the battle of Mantinea, in 362 B.C., and was the supremacy principally of one man, Epaminondas. Democracy was once more predominant. The Peloponnesus was invaded, Arcadia was formed into one state, with a new city, Megalopolis, as the head, and Messenia was made independent of Sparta. Athens united with Sparta in resisting Thebes, and in the battle of Mantinea (362 B.C.), though the Thebans were victorious, Epaminondas was killed. Athens now tried to reëstablish her empire over her former allies, but without success; the Social War (c.357–355 B.C.) secured the independence of nearly all the states.

In the meantime there was coming into prominence north of Greece a new power, which was destined to absorb within itself all the Grecian lands. This power was that of the Macedonians, a race akin to the Greeks, but looked upon by the Greeks as barbarian. Philip, the son of Amyntas II, became King of Macedonia in 359 B.C., and, after establishing himself firmly on his throne, at once proceeded to annex the Greek colonies on the coast of Macedonia and Thrace. One by one they fell into his hands—Amphipolis, Pydna, Potidæa, Methone, and the others. He next took steps to gain a footing in Greece, and the opportunity was offered him by the Sacred War between Thebes and Phocis, which broke out about 357 B.C. The Amphictyonic Council, influenced by Thebes, inflicted a heavy fine on the Phocians for having tilled certain waste ground belonging to Apollo, and the latter obtained the support of the tyrants of Pheræ in Thessaly. Thereupon the noble Thessalians invited Philip to enter Greece and lend them his aid, an invitation he was only too ready to accept. Entering Thessaly, he went as far south as Thermopylæ, but was there met by an Athenian force and prevented from proceeding farther. Returning to Thrace, and continuing his conquests in that direction, he in 347 B.C took the Chalcidian town of Olynthus, and soon after the whole Chalcidian peninsula fell into his hands. Though opposed by a party at Athens, led by the orator Demosthenes, he advanced almost unchecked, accomplishing as much by bribery and deception as by force of arms. He received at the hands of the Amphictyons the two votes in their assembly to which the Phocians had been entitled, but of which they had been deprived, and also a share in the presidency of the Pythian Games. Being once more invited into Greece, this time by the Amphictyons to take part against the Locrians, he advanced into Bœotia, and was met by the Bœotians and Athenians at Chæronea (338 B.C.); this battle was a victory for Philip and the death knell of Grecian independence. A congress of Greek states, held at Corinth in the next year, recognized Macedonian supremacy in Greece and appointed Philip commander in chief of the Greek forces. Philip immediately began preparations for invading Persia, but was assassinated in 336 B.C., and his son, Alexander, 20 years of age, succeeded him.

At the death of Philip a general rising against the power of Macedonia was threatened, but it was quickly suppressed by the energy of the new king. Having made an example of Thebes, which he razed to the ground, he set out in 334 B.C. on his famous invasion of Persia. The conquests of Alexander in the East extended Greek influence and Greek civilization and language throughout a great part of Asia. He founded Alexandria, which, under the Greek dynasty of the Ptolemies, soon rose to be the greatest centre of civilization in the world. Alexander died at Babylon in 323 B.C., and his empire was divided among his generals. Among those who shared in this partition of power were Perdiccas, Antipater, Crateras, Antigonus, Eumenes, Ptolemy Lagi, Lysimachus, Polysperchon, Cassander, Seleucus, and Demetrius Poliorcetes. Of the states established by the successors of Alexander, the so-called Diadochi, the most important were the Greek Kingdom of Egypt (the realm of the Ptolemies) and the Kingdom of Syria (the realm of the Seleucidæ). Later the Kingdom of Pontus rose to great power under the Greek dynasty. An effort was made by Greece to throw off the yoke of Macedonia, and the war, called the Lamian War, was ended by the victory of Antipater, Regent of Macedonia, at Crannon in 322 B.C. In the wars of the successors of Alexander, Greece was often the battlefield of the contending forces. Two attempts were made in this period at federation. The Achæan League (see ACHÆA), formed about 280 B.C., included Athens and other cities of north Greece, and Corinth, as well as much of the Peloponnesus. The abilities and patriotism of Aratus and Philopœmen (the latter styled the "last of the Greeks") shed lustre upon this confederacy, which for many years maintained the cause of Greek independence (i.e., freedom from Macedonian control) against foreign conquerors. The Ætolian League (q.v.) was formed in central Greece, but was less famous than the Achæan. In 197 B.C. Philip V of Macedon was defeated at Cynocephalæ by the Romans, and in 196 B.C. the freedom of Greece was proclaimed by the victorious Roman general Flamininus at Corinth. In 168 B.C., by the battle of Pydna, and in 146 B.C., with the destruction of Corinth by the Roman general Mummius, Greece passed completely into the hands of the Romans, who made of it a province, under the name of Achæa (q.v.).

Foreign Rule. From the completion of the Roman conquest by the capture of Corinth in 146 B.C. until the outbreak of the Mithridatic Wars in 88 B.C., Greece enjoyed a just and wise administration under the Romans, and the country prospered. The nationalist revolt which followed the first successes of Mithridates against the Romans changed these conditions. Athens was sacked by the forces of Sulla in 86 B.C., and Thebes was reduced in the following year. The hand of Rome fell heavily upon the rebellious cities, and that decline began from which the country never recovered. Under the emperors Greece enjoyed renewed tranquillity, its supremacy in thought and letters was recognized, and there was a partial return to prosperity. The Emperor Hadrian and Atticus Herodes (q.v.), the friend of the Antonine emperors, did much to restore the splendor of the ancient civilization. In the middle of the third century A.D. this condition was disturbed by the Gothic hordes, which overran the peninsula, captured Athens, and laid waste the cities of Argos, Corinth, and Sparta. (See GOTHS.) Christianity, after the third century, spread rapidly in Greece in spite of the opposition it had to meet from the philosophers of Athens, which to the end remained the centre of pagan culture. When the world empire founded by the Romans fell to pieces before the attacks of the northern barbarians, the eastern half, which embraced all that was Greek, continued its existence as the Byzantine, or Greek, Empire. But this Greek Empire, with its seat at Constantinople, which outlived the Western Empire by a thousand years, until it was extinguished by the Turks in 1453, was the mixed Oriental Greece, not that classic Hellas that had been the bulwark of the Western world. (See BYZANTINE EMPIRE.) The life of the true Greece was obscured for several centuries, only appearing as the peninsula became an object of conquest or an arena of strife. Before the final division of the Roman Empire the rulers of Rome attempted to Romanize the East by introducing into the language of the period a mingling of Latin and Greek, known as Romaic; but they failed to overcome the strong race characteristics of the people. From the sixth to the eighth century Slavic peoples from the north crowded into the Balkan Peninsula. The invaders were merged to some extent with the ancient race and remained in occupancy of Illyria and Thrace, producing a mixture of nationalities which constitutes at the present day one of the chief elements of confusion in the puzzling problems of the Balkan Peninsula. The ambition of the Frankish leaders of the Fourth Crusade and the greed of Venice interrupted the continuity of Byzantine rule, establishing the short-lived Latin Empire of the East (1204–1261), and dividing the Hellenic peninsula into a number of feudal fiefs, of which the Duchy of Athens was the most prominent and the longest lived. Held for a century (1205–1308) by the Frankish house of De la Roche, then for a few years by that of Brienne, the duchy became after the conquest by the Catalan Grand Company (q.v.), in 1311, an appanage of the Kingdom of Aragon. In 1385 it was acquired by the Florentine family of Acciajuoli, under whom it remained until the Turkish conquest in 1456. During this period the court of Athens was one of the most brilliant of the feudal courts of Europe. Soon after the capture of Constantinople in 1453, Mohammed II turned his attention to the Morea and Attica, and by 1460 they had been completely subjugated. The Turkish conquest, sending thousands of Greeks into exile, spread the intellectual influence of the race through the West and promoted the revival of learning in Europe. (See RENAISSANCE.) The Venetians still held many places in the Greek islands, and defended them obstinately in an almost constant series of wars until 1718; but gradually the islands, like the mainland, fell into the hands of the Turks. The great naval battle of Lepanto (Naupactus), won by the allied papal, Spanish, and Venetian fleets, Oct. 7, 1571, gave the Christian powers a temporary advantage which they failed to follow up. Venice lost Crete in 1669, but in 1684 the Venetian Admiral Morosini opened a vigorous campaign, which resulted in 1687 in the conquest of the Morea and of Attica. During the siege of Athens (1687) the Parthenon was ruined by the Venetian bombardment. The Peace of Carlowitz in 1699 left the Morea alone in the possession of Venice; and in 1715 this was again conquered by the Turks after a feeble defense, and by the Peace of Passarowitz (1718) the Ottoman Empire remained in full possession of Greece. The country was administered in the usual Turkish fashion. It was divided into pashalics, within which the pashas ruled autocratically, being held accountable only for a certain amount of revenue, which they wrung from the unfortunate people. The same was true of officials of lesser rank, beys and agas, within the districts intrusted to them. Prostrated under an alien and irresponsible tyranny, the country lapsed into anarchy and poverty. All over Greece many of the more vigorous and independent of the people adopted the wild, free life of *klephts*, or brigands, having their lairs in the mountains and waging unceasing warfare against the Turks. Among them the spirit of independence was kept alive, although with a total disregard for authority. Terrible as was the rule of the Turks, they allowed two institutions to exist which acted as powerful forces towards maintaining intact the nationality of the Greeks. One was the Greek church, the other the system of local self-government. In the eighteenth century Russia sought to extend a helping hand to the Greeks, her coreligionists, but little of moment was achieved. Large numbers of Greeks found a field for their activity in commerce and navigation, and they preserved the national life from stagnation and kept the people in touch with the outside world. Those who resided in foreign countries under freer governments, many of whom acquired wealth and influence, remained devoted to the fatherland and fostered the spirit of independence by helping to establish national institutions of learning. At the close of the eighteenth century the trade of the ports of Greece and of the Greek islands assumed great proportions, and the merchant marine became a school whence was to issue a large array of naval heroes.

The War for Independence. At the beginning of the nineteenth century the Greeks everywhere began to plan for a national revival, the chief agent being a great secret association, the Hetæria, which extended wherever in the world Greeks were to be found loyal to the national cause. The way for such a movement had been prepared by the labors of the patriot scholar Coray (q.v.), who had devoted himself to the task of restoring the classic language of ancient Hellas, with the conscious purpose of effecting thereby a resurrection also of the old national spirit. In March, 1821, at Jassy, the capital of Moldavia, Alexander Ypsilanti, head of the Hetæria, expecting aid from Russia, raised the standard of revolt, and the 10 years' struggle was opened. Ypsilanti's daring deed soon ended in disaster, but it was the signal for a great uprising, which at once began in the Morea. The Porte sought to check the revolt by wholesale massacres and executions, but the rebellion grew in spite of constant defeat. The people revived the memories of the ancient Greeks by their heroic deeds, on land and sea, under the lead of such men as Kolokotronis, Ypsilanti, Mavrokordatos, Bozzaris, and Miaulis. Tripolitza, in the Morea, the capital of that pashalic, was captured by the Greeks, Oct. 17, 1821. At Epidaurus in January, 1822, the first National Assembly framed a constitution. The war was waged with savage ferocity by both sides. The Greeks slaughtered the Turks in Morea, while in March occurred the terrible massacres perpetrated by the Turks on the island of Scio (Chios), when about 25,000 people were slain within a month and thousands more were sold into slavery. In spite of these atrocities, however, the members of the Holy Alliance, at the Congress of Verona in the last months of 1822, called upon the rebellious Greeks to return to their obedience. Among the deeds of the patriots in the year 1822 was the destruction of the Turkish admiral's ship at Chios (night of June 18–19), and of another vessel of the line (in November) by the fire ships of Kanaris, and the victories of Kolokotronis over the invading Turkish army in the Morea. In August, 1823, occurred the brilliant exploit of Marco Bozzaris (q.v.) at Karpenisi, near Missolonghi. Funds to aid the patriots were obtainable only on exorbitant terms, but the generous contributions of wealthy Greeks and of sympathetic foreigners (see PHILHELLENES) maintained the long struggle against fearful odds. Among those who stirred up Europe in the cause of Greek independence was Byron. The Sultan at last called in Mehemet Ali (q.v.), who had already made a sinister reputation in Egypt, to suppress the rebellion. An Egyptian army of 11,000 men under Ibrahim Pasha landed in the Morea in February (1825). Navarino was taken in May, Tripolitza in June, and within half a year the entire peninsula had been subjugated. In April, 1826, the Turks took Missolonghi, after an heroic defense of a year on the part of the Greeks, and on August 15 Athens was taken by storm. The misfortunes of the Greeks during this period of the war were due in great measure to the dissensions between the Constitutional party and the supporters of a military dictatorship. A temporary reconciliation between the two parties was effected in 1827, and in March the National Assembly at Trœzen amended the constitution so as to provide for a single executive. Count Capo d'Istria (q.v.) was chosen President and assumed the government at the beginning of 1828. Party quarrels, however, broke out again almost immediately. On June 5, 1827, the Greek garrison in the Acropolis of Athens, which had held out after the lower town was taken, capitulated. The Greek cause seemed in a most deplorable condition; but the probable results of Turkish success in strengthening the power of Mehemet Ali in Egypt stirred the European cabinets at last to intervention. The London protocol of July 6, 1827, signed by England, France, and Russia, called for an armistice and intervention. The Porte, still supported by Austria, refusing to hear from the Powers on the subject, the allies strengthened their naval forces in the Mediterranean. The defiant action of Ibrahim Pasha precipitated the desperate battle in the Bay of Navarino, October 20, in which the combined Egyptian and Turkish fleet was practically destroyed by a much lighter force. Soon after a French force landed in the Morea, and Ibrahim Pasha found himself compelled to withdraw his army. The onslaught made by Russia upon the Ottoman Empire in 1828–29 finally forced the Porte to accept a settlement proposed by the Powers. In the Treaty of Adrianople (q.v.) between Turkey and Russia, Sept. 14, 1829, the Porte pledged its consent to whatever arrangements the Powers might conclude in respect to Greece. The London Protocol of the Great Powers, in February, 1830, declared Greece an independent kingdom, but with boundaries shrunken from those that had been agreed upon at London in 1829, and was accepted by the Porte. In that country meanwhile the cessation of war had been followed by a period of great unrest. Great dissatisfaction was felt with the course adopted by Capo d'Istria in neglecting to call the popular assembly, and in ruling after the manner of a dictator. Capo d'Istria was assassinated Oct. 9, 1831, in Nauplia, and Greece was for a short time ruled by a regency of seven men. On May 7, 1832, after long negotiations with various foreign princes, Otho, the second son of King Louis I of Bavaria, was made King by the Powers and landed in Greece early in the following year. The reorganization of the country was undertaken under a Bavarian regency, the King being only 17 years of age. A loan of 60,000,000 francs was guaranteed by the Powers. King Otho came of age in 1835, and in the same year the seat of government was transferred from Nauplia to Athens.

Recent History. The Greeks believed in constitutional government and in the principle of popular participation in the political life of the state. This was denied to them under the Bavarian rule, constitutions being frowned upon by the continental Powers at that time. Thus the government was out of touch with the people, and the discontent was increased by the faulty administration of the finances, which burdened the country with unprofitable taxation. England and France urged upon King Otho the advisability of giving the people a constitution, but he delayed until the revolution was already under way. This broke out in a bloodless way at Athens, Sept. 15, 1843, and the King was compelled to dismiss his advisers and to grant a constitution. The new constitution, however, did not restore the local self-government so dear to the Greek nor satisfy the aspirations of the people. At the opening of the war between Russia and Turkey in 1853 Greece invaded Thessaly and Epirus, hoping that the time had come to recover the Hellenic heritage. To prevent any alliance between Greece and Russia, French and English forces landed at the Piræus in 1854 and remained in occupation until 1857. This incident increased the national discontent with the King and his government. The popular feeling, stimulated by the example of a regenerated Italy, took revolutionary form in 1862. In February the garrison at Nauplia revolted, and that of

Athens followed in October. Otho was deposed and, failing to obtain the support of the Powers, was compelled to leave the country. The choice for a new sovereign finally fell upon the second son of the King of Denmark, who became King of Greece as George I. The choice being acceptable to England, that country in 1864 ceded to the new monarch the seven Ionian Islands, which since 1815 had constituted a republic under a British protectorate. This was an important accession, as the islands were prosperous and had constantly desired reunion with Greece. By the constitution of 1864 the legislative functions of government were vested in the Boule, comprising a single chamber, elected by universal suffrage for a term of four years. So demoralizing had been the experience of the country that brigandage was not suppressed until 1870.

Perhaps the greatest national aim of the constitutional kingdom has been the restoration of the historic Hellas; and the dissatisfaction of the people with existing territorial conditions has been a continual disturbing element in the Eastern situation. The Congress of Berlin (q.v.) in 1878 recommended a readjustment of the unfair and unscientific northern boundary; but Turkey refused to make the concessions demanded, and war between the two countries seemed inevitable. Finally, after protracted negotiations, the Powers in 1881 accepted the compromise offered by the Porte, giving Greece all Thessaly south of the northern watershed of the Salambria, including Larissa and Trikala, and in Epirus running the boundary along the Arta River, leaving Arta to Greece—an addition of 13,000 square kilometers, with a population of 300,000. Greece was not satisfied with this settlement, but accepted it as the best arrangement possible at the time. The island of Crete was regarded by the Greeks as a natural Hellenic possession, and the desire for its union with the kingdom was intensified by sympathy for the Cretans under Turkish misrule. The bloody conflict between the Christians and Mohammedans that broke out in Crete in 1896 led Greece to make an attempt to annex the island. This action brought about the interference of the Powers, who decreed the autonomy of Crete and proceeded to compel Greece to withdraw her forces.

The Cretan disturbances gave the war party in Greece an opportunity to fan the embers of national passion into life and to bring on a war with Turkey, in the hope of arousing Macedonia to revolt and winning much of the desired territory on the north. Greece was wholly unprepared for such a conflict, while the Turkish armies were in a comparatively efficient condition. Yet, in spite of all restraining counsel and without any countenance from the Powers, without whose support such a contest was destined to be futile, the war party precipitated the struggle. Greek irregulars, members of a war secret society, opened the fighting in Macedonia early in April, 1897. On the 17th of April the Porte declared war, charging Greece with being the aggressor. The campaign of 31 days that ensued was inefficiently managed upon the Greek side. The Turks forced one position after another, the Greeks showing an unsteadiness in marked contrast to the discipline and determination of the Turks. The latter threw back the advanced line of the Greeks, who at first had a distinct strategic advantage, invaded Thessaly on April 21, and occupied Larissa on the 25th, while the Greek army, now a panic-stricken mob, was in headlong flight. Heavy fighting occurred at Velestino April 25, and at Fersala May 5. The plain of Thessaly was occupied by the forces of Edhem Pasha, and in the third week of May the Turks held the line of the Orthrys Mountains and threatened central Greece. Their advance was stopped only when Russia peremptorily demanded an armistice. This was concluded on May 18. Preliminaries of peace were signed September 18, and on December 4 the definitive treaty was signed at Constantinople. Greece was required to pay an indemnity to Turkey amounting to $18,000,000, the payment to be supervised by an international commission of the mediating Powers, which also undertook to rectify the frontier. In 1898 the Powers compelled Turkey to withdraw her forces from Crete, and Prince George of Greece was installed as Governor of the now autonomous island. The internal political disputes, together with the clash of Christian against Mussulman, proved to be obstacles too great for Prince George to surmount. He resigned in 1906, and the Powers invested the appointment of the succeeding High Commissioner in King George. M. Zaimis, a former Greek premier, was selected, and at the same time Greek officers took charge of the Cretan army. The overthrow of Abdul Hamid in 1908 by the Young Turks was immediately followed by a declaration of union with Greece on the part of the Cretan Assembly. The Powers, however, refused to allow this violation of the agreement made in 1898. During the settlement of this question the cautious policy of the Greek government in not pressing their claims to Crete excited the disapproval of the war party, and an organization termed the Military League really controlled the government during the year 1909, but failed to force Greece into war. Immediately after the outbreak of the Balkan War Cretan delegates were admitted to the Greek Parliament, and by the Treaty of London (1913) Crete was finally ceded to Greece.

Meanwhile Greece was embroiled in the Macedonian situation. The conflicting racial and religious hatreds and political ambitions of Turkey, Bulgaria, Rumania, and Greece disrupted the province and gave rise to a bloody internecine war that was waged in nearly every section of Macedonia. Greece was jealous of the influence of Bulgaria, which had been displayed in the uprising of 1903, and lent assistance to Turkey by encouraging guerilla bands to cross the frontier and attack the Bulgarian and Rumanian elements in the Macedonian population. This excited retaliation on the part of the two latter nations, and the feeling grew so acute that in 1905 diplomatic relations between Greece and Rumania were severed and were not resumed till 1912.

The weakened condition of Turkey led to the coalition of Bulgaria, Servia, Montenegro, and Greece, and the Balkan War (q.v.) began in the fall of 1912. The greatly increased efficiency of Greece in military matters after the disastrous War of 1897 was seen in the splendid performances of the Greek army in their campaign in southern Macedonia, notably in the capture of Saloniki. The navy performed valuable service by preventing the transportation of Turkish troops from Asia Minor to the Balkans, and also in its assistance towards the capture of Turkish islands in the Ægean. King George, while on a tour of inspection, was assassinated in Saloniki on March 18, 1913. Crown Prince Constantine succeeded to the throne. The war between the allies (see Balkan War) was marked by extreme cruelty, in which it was charged that the Greeks had been the worst offenders. This, however, was denied by the Greek government. The Bucharest Conference apportioned to Greece, as her share of the conquered territory, all of Thessaly, part of Epirus, and the most valuable regions of Macedonia and Thrace, including Saloniki. In addition Crete, so long desired by Greece, was given to her, together with the islands of the Ægean not occupied by Italy. The ambition of the Greeks for a greater Hellas was partially realized by this addition, which nearly doubled the area and population of Greece. At the outbreak of the European War of 1914 Greece announced a policy of strict neutrality. See War in Europe.

Bibliography. Consult the histories of Grote, Curtius, Duncker, Thirlwall, Abbott, Holm—though rendered out of date by recent discoveries, they still have value; also Freeman, *History of Federal Government in Greece* (London, 1893); Droysen, *Geschichte des Hellenismus* (Gotha, 1877–78); Kaerst, *Geschichte des hellenistischen Zeitalters,* vol. i (Leipzig, 1901); Cox, *History of Greece* (London, 1874); id., *The Athenian Empire* (ib., 1877) and *The Greeks and Persians* (ib., 1876). The standard history of Greece from 146 B.C. to 1864 A.D. is that of George Finlay, a Scotchman, who took part in the War for Independence and spent much of his life in Greece (new ed., 7 vols., Oxford, 1877). The division of the subject in Finlay's volumes is a convenient guide to the large periods of modern Greek history: I. Greece under the Romans, 146 B.C.–716 A.D.; II. The Byzantine Empire, 716–1057; III. Byzantine and Greek Empires, 1057–1453; IV. Mediæval Greece and Empire of Trebizond, 1204–1461; V. Under Ottoman and Venetian domination, 1453–1821; VI. Greek revolution, 1821–27; VII. Establishment of the Greek Kingdom, 1827–64. Later works are Beloch, *Griechische Geschichte* (3 vols., Strassburg, 1893–1904); Busolt, *Griechische Geschichte* (3 vols., Gotha, 1893–1904), indispensable for its examination of sources and its citation of varying views; it lays special emphasis also on politics and constitutional history. Brilliant and interesting is Meyer, *Geschichte des Altertums,* vols. ii–v (Stuttgart, 1893–1902). Important, too, is Pöhlmann, *Grundriss der griechischen Geschichte nebst Quellenkunde* (4th ed., Munich, 1914; pages 1 ff. deal with works on Greek history). The best one-volume history is that of Bury (London, 1900), which ends with the death of Alexander the Great. Consult also Zimmern, *Greek Commonwealth, Politics and Economics in Fifth Century Athens* (Oxford, 1911), and Phillipson, *International Law and Custom of Ancient Greece and Rome* (London, 1911).

Consult also: Tennent, *The History of Modern Greece, B.C. 146 to A.D. 1820* (London, 1830, 1845); Crousse, *La péninsule gréco-slave, son passé, son présent et son avenir* (Brussels, 1876); Lavisse and Rambaud, *Histoire générale* (12 vols., Paris, 1893–1900). There are also several histories in Greek, among them being those of Trikupis (London, 1860), Papparigopulos (ib., 1886), and Lambros (Oxford, 1886). On special periods or phases of the subject, the following deserve notice: Phillips, *The Greek War of Independence 1821–33* (London, 1897); Isambert, *L'Indépendance grecque et l'Europe* (Paris, 1900); Bérard, *La Turquie et l'hellénisme contemporain* (ib., 1893); id., *Les affaires de Crète* (ib., 1900); Jebb, *Modern Greece* (London, 1901); Martin, *Greece of the Twentieth Century* (ib., 1912); Ferguson, *Greek Imperialism* (Boston, 1913); Garnett, *Greece of the Hellenes* (London, 1914); *Cambridge Modern History* (12 vols., New York, 1902–12).

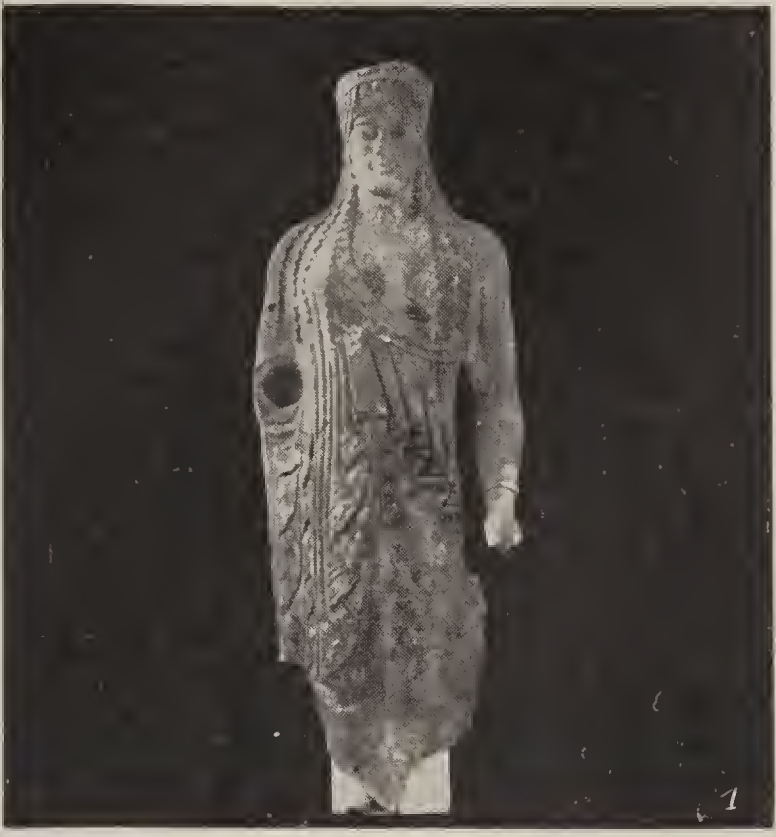
GREEK APOCALYPSE. See Baruch, Books of.

GREEK ART. The importance of Greek art and the universal interest in it are due not only to the high degree of perfection which it attained—the highest, all things considered, that the world has seen—but also to its influence upon the universal development of art. All the art of the western world—Roman, Mediæval Renaissance, and Modern—is descended from it, and it was, besides, a very important factor in the development of the Orient during and after its flower. (See Mohammedan Art; Indian Art; Chinese Art.) Modern art in the western world has been twice reformed by the study of Greek survivals—at the time of the Renaissance and during the classical revival of the late eighteenth and the early nineteenth centuries. Even at the present time its architectural forms are those most in use, and its sculptures are the models most studied.

The present article is concerned chiefly with the so-called Major Arts—architecture, sculpture, and painting. The important Decorative (or Minor) Arts of Greece are best treated under their respective headings, specified more fully in the distributive paragraph, *The Decorative Arts,* near the close of the present article. A summary, critical treatment of Greek art as a whole is offered in the article Archæology.

Prehistoric Art in Greece. The art of the pre-Mycenæan and the Mycenæan periods need not be separately treated here, as its influence is chiefly felt in other fields than those of architecture and sculpture, and its Hellenic character is still a subject of discussion. (See Archæology, *Minoan, or Ægean, Period;* Architecture, *The Ægean Style.*) No connection is traceable between the reliefs of Mycenæ and Crete and the rude beginnings of Hellenic sculpture in the seventh century B.C. In building the case is somewhat different, and, though the gap is still a wide one, there can be little doubt that the Doric temple is derived from the Mycenæan house, at least in some of its characteristic features. (See Architecture, *Greece.*) The essential element of these early dwellings is the large rectangular room, to which entrance is gained through a vestibule or portico formed by prolongation of the side walls and often partially closed in front by pilasters or columns. The plan is therefore that seen later, fully developed, in a temple *in antis.* The materials used were stone for the foundations, crude brick for the walls, and wood for the roof columns and facings of the ends of the walls, where they were most exposed. The roofs were probably flat and covered with earth, as is common in the East to-day. Between the decline of the Mycenæan period and the earliest extant Doric temple, the Heræum at Olympia (q.v.), is a gap of some centuries, and in that time the adaptation or transformation of the human house into a dwelling for the god has been completed.

GREEK ART



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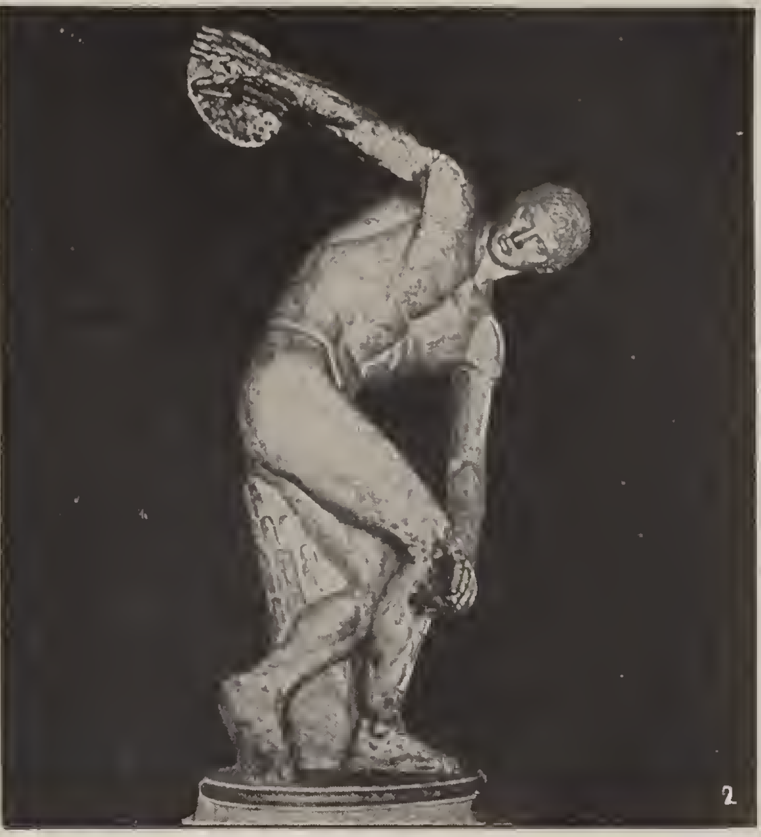

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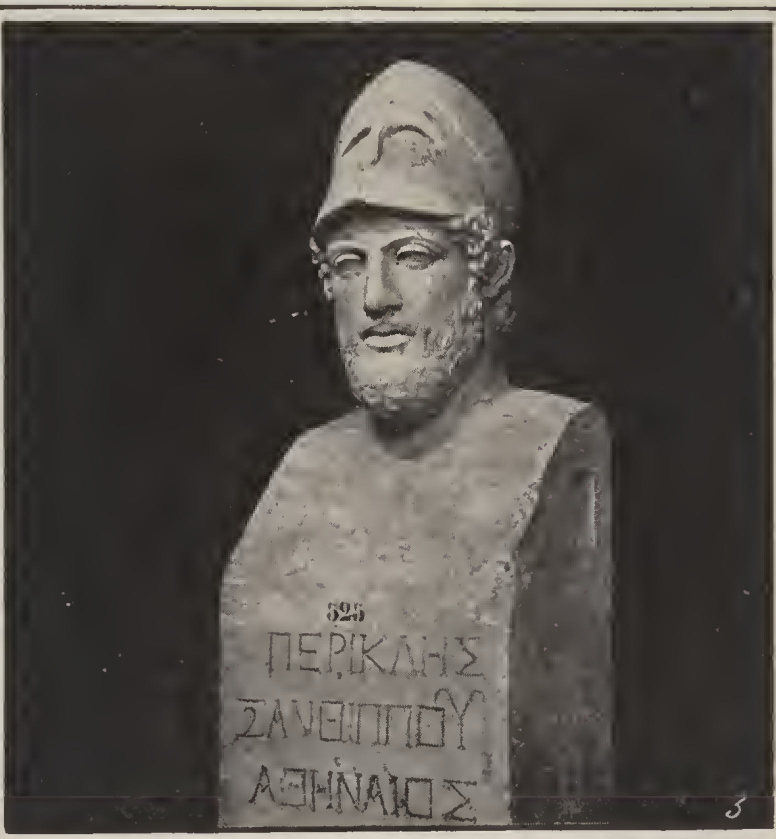

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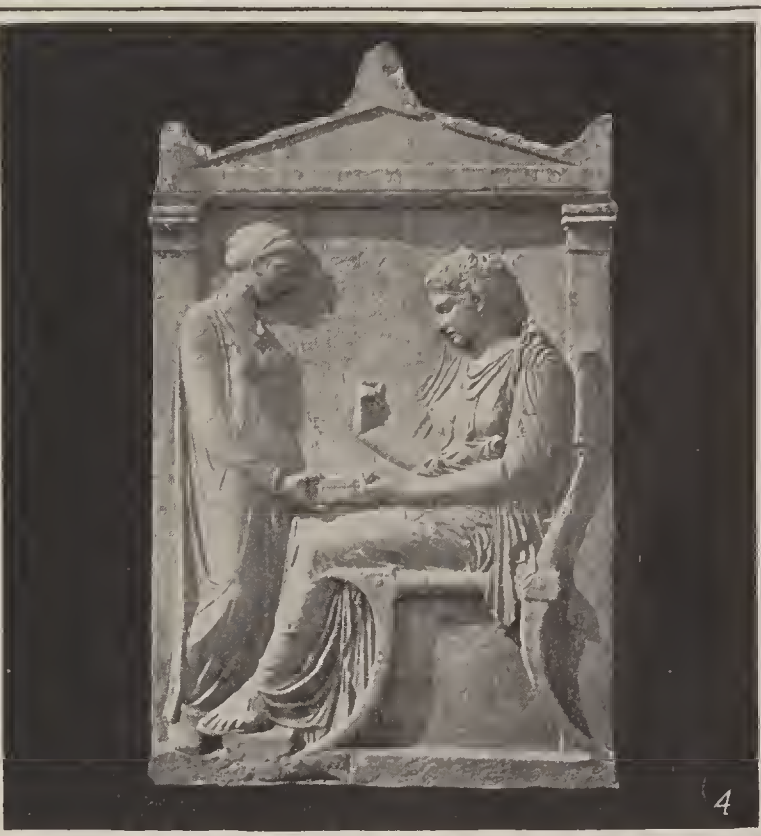

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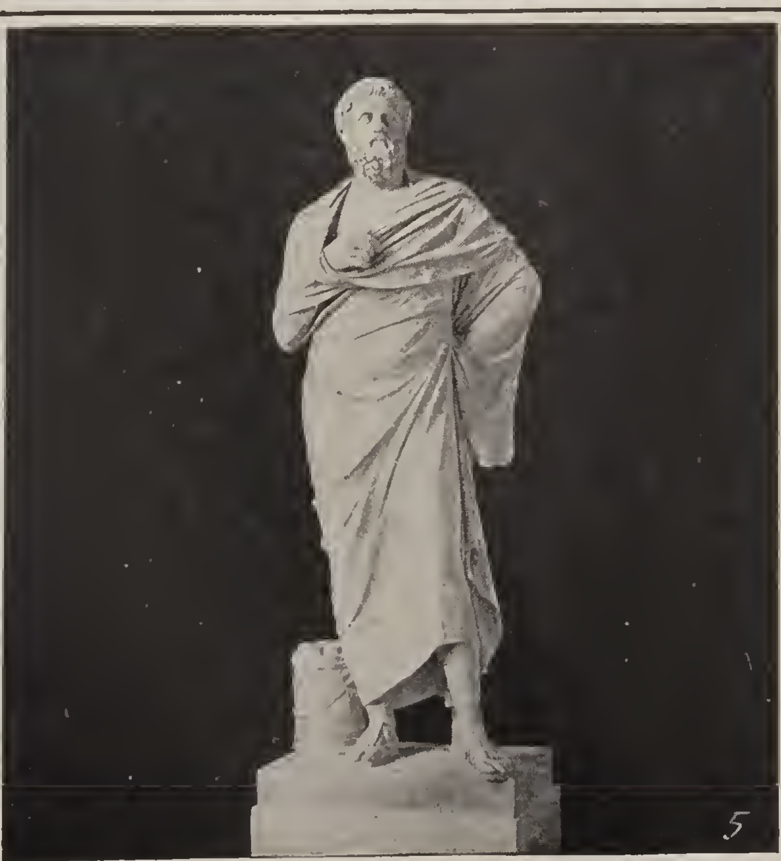

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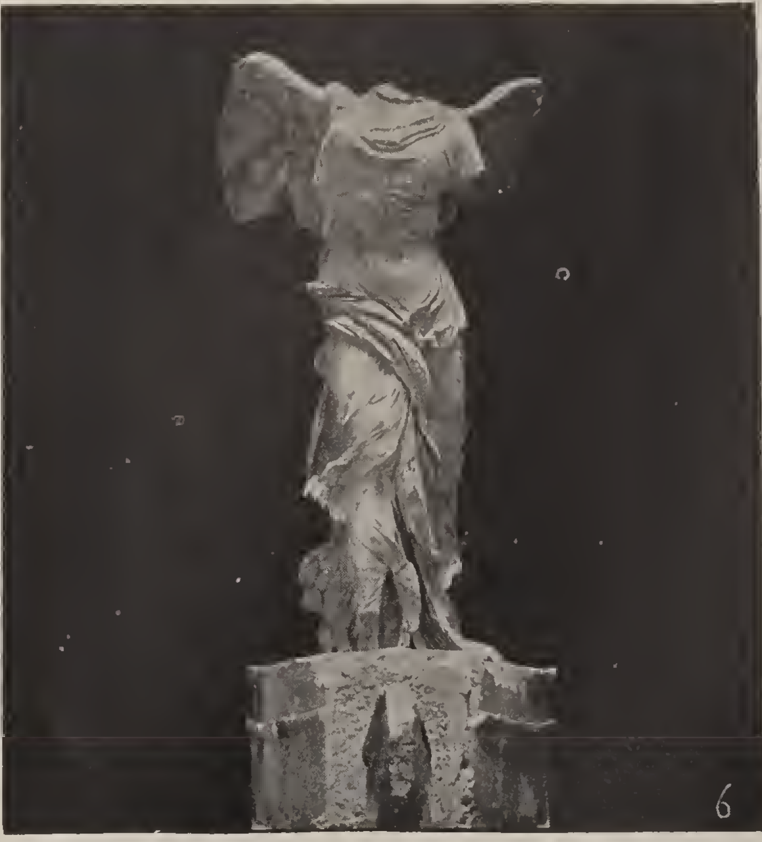

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REPRESENTATIVE WORKS

1. ARCHAIC FEMALE FIGURE from the Acropolis, Athens.
2. DISCUS THROWER by Myron, Rome.
3. BUST OF PERICLES, probably a copy of a statue by Cresilas.
4. GRAVE MONUMENT of Hegeso, Ceramicus, Athens.
5. SOPHOCLES, Lateran Museum, Rome.
6. THE VICTORY FROM SAMOTHRACE, The Louvre. Paris.

ARCHITECTURE

In architecture, especially of religious and civic buildings, the Greek genius expressed itself with a perfection of originality and of execution inferior only to that displayed in Greek sculpture. The origins of this architecture are lost in obscurity, for there appears to be a complete sundering between the forms of the Mycenæan or Ægean architecture and those of historic Greece. The distinctive feature of historic Greek architecture is the column; all important buildings were columnar; and it was the Greeks who developed the colonnade as an essential element of the exterior design. Greek also was the idea of the *order*, i.e., of a definite association of a particular type of column with a particular type of entablature. Whether the Doric order, the oldest and most typically Greek, was developed from wooden prototypes or from prehistoric buildings employing both wood and crude brick or rubble, is uncertain; the entablature shows unmistakable reminiscences of wooden construction. While the original construction of the Heræum at Olympia long antedated the first Olympiad (776 B.C.), no part of the extant ruins of the superstructure at least is older than the seventh century B.C., and the most ancient example of the order are the ruins of the temple of Apollo at Corinth, dating from about 650 B.C. One of the temples at Selinous (Sicily) is nearly as old. From that date until the Christian era the Doric was really the national style of Greece; and the order, used alike in temples, colonnades, and gateways, underwent little change except in the progressive refinement of its details and proportions. During the sixth century the Ionic order was introduced, as a semiforeign style, probably from Asia Minor. Its slender columns, contrasting with the massive Doric, were indubitably derived from wooden prototypes. In Attica, with its mixed Doric-Ionic population, it found especial favor and was used sometimes alone, as in the Erechtheum (q.v.), sometimes in the interiors of buildings externally of the Doric order, as in the Propylæa of Athens. A variant of this order, still more elegant in its details, which was known as the Corinthian, came into use in the fourth century. (See ORDERS OF ARCHITECTURE.) In the Greek provinces of Asia Minor the Ionic was the national style and reached its most splendid expression there in the Alexandrian age, in such colossal temples as that of Diana at Ephesus (see ARTEMISIUM) and of Apollo at Miletus.

The Temple. Greek architecture, as has been said, was chiefly one of temples and civic buildings, such as arsenals, gates, colonnades, or *stoæ*, tombs, etc.; but the temple was preëminent. The Greek temple was the very reverse of the Egyptian; its chief architectural splendor was external; its interior, relatively small, was a shrine, or *naos*, for a superb image of the presiding deity; neither great loftiness, length, nor spaciousness was aimed at. Sculptures, both in relief and free-standing, adorned the exterior, in friezes, pediments, and even at Ephesus, upon the shafts of the columns. The essential elements of the temple were the *cella*, or windowless hall, divided sometimes into two parts—a treasury, or other chamber, and the *naos*, or temple proper; and porches or colonnades, whose various arrangements gave the names to different types: *prostyle* when a single porch stood in front of the naos; *amphiprostyle*, with porches both at front and rear; *peripteral* or *peristylar* when a colonnade wholly surrounded the cella; *dipteral* when a double row of columns flanked the cella on each side; *pseudodipteral* when the aisle, or *pteroma*, along each flank was of double width. According as the number of columns in the end row was two (set between the ends of the projecting side walls), four, six, eight, nine, or ten, the temple is said to be *distyle in antis, tetrastyle, hexastyle, octastyle, enneastyle, decastyle*, respectively.

Greek architecture, exclusive of the Mycenæan, covers a period of about six centuries, so far as dated remains are concerned, and reaches its culmination in the Periclean age, after the Persian wars. The Parthenon (q.v.) is universally regarded as its supreme achievement, though later temples in Asia Minor were more splendid and far larger. The Parthenon, with the Propylæa, Erechtheum, and temple of Wingless Victory (Niké Apteros), all built between 468 and 408 B.C., present an unequaled group of architectural masterpieces in which simplicity and restraint are combined with the most exquisite refinements of execution. (See REFINEMENTS OF ARCHITECTURE.) During the Alexandrian age (second half of the fourth century), architecture became more florid in detail, more ostentatious but less pure and refined, and a slow decline set in, until it was overwhelmed or displaced by the Roman Imperial architecture.

The Greeks developed no palace architecture; no domestic architecture of any importance, unless the Pompeiian be considered as a late phase of it or derivative from it; no type of civic hall; and their theatres, being chiefly excavated, offered little or no opportunity for the display of architecture properly so called. The field of Greek architecture was thus extremely restricted, and to this in part are due the thoroughness with which it was tilled and the perfection of its fruitage. The Greeks were the first builders to strive after an ideal perfection instead of a mere advance on the past. Hence the finality of their achievement in it. See ARCHITECTURE; ORDERS OF ARCHITECTURE; PROPYLÆA; STOA; TEMPLE; THEATRE.

SCULPTURE

Technique. Though wood and clay were sometimes used in sculpture, the common materials were stone and metal. In the early days of sculpture in stone the softer varieties of limestone, especially the so-called *poros*, were frequently employed because of the comparative ease of working. Later the harder marbles were employed, especially the fine white marble of the island of Paros, and from Mount Pentelicus in Attica. The sculptor seems in general to have worked without mechanical copying of a model. For blocking out the statue a pointed instrument, either a punch or a hammer, was employed, and the finer details were worked out with chisels of various shapes. In some of the earlier statues the deep folds of drapery seem to have been cut out by the saw; but later the borer was used, especially after the time of Callimachus (q.v.), who is credited with its invention by Pausanias, though it was almost certainly in use at an earlier date. Frequently the head and other parts of the body were carved separately and of better material. In bronze the earliest works are in hammered metal, with engraved details; but at an early date casting was introduced, and thus the production of larger pieces became possible. Heretofore such statues had been produced by plating on wood or riveting together metal plates. Solid casting was obviously too wasteful, and we early find examples of hollow casting, though the exact method of preparing the mold and the core is uncertain. In later times the Greek artists used the *cire perdue* process; it is possible this was in use before the end of the fifth century. Bronze was always the favorite material for honorary statues, and the artists in bronze seem to have enjoyed a higher esteem than their brethren who worked in stone.

Polychromy. The plain white of the marble was too dazzling and monotonous for Greek taste; moreover, when poorer materials were used the stone often required color or stucco to conceal its imperfections. Our knowledge concerning the details of the coloring of the temple is not very complete, though it has been much enlarged by the careful attention paid to the subject in recent excavations. In the Doric building the triglyphs seem to have been regularly blue; the metopes vary—at Olympia they were either blue or brown, with the reliefs in contrasting colors, while elsewhere red was also used. The smaller architectural members, such as mutules, regulæ, and guttæ, were also colored; but the walls, architrave, and columns (except possibly the neck and sometimes the echinus) were plain. In the Ionic order color seems to have been used on the capital, but there is little knowledge of details.

In sculpture the question has been much discussed. It is clearly impossible to lay down general rules, for the practice varied with the time, place, material, and technique. What holds of the relief will not hold of the statue. Color was extensively used on all terra-cotta productions, and, as we have seen in the preceding paragraph, it was also employed on sculptures forming part of a building. In general, the more valuable the material, the more sparing the use of color. In the earlier works in coarse stone a very elaborate and brilliant system is used; later only the details are indicated by color. Except in architectural reliefs, there is very little evidence of the use of color on the nude parts of marble. In statues such surfaces seem to have been treated with wax and oil, thus toning down the surface of the marble and giving it a slight polish. The hair, lips, and eyes were regularly painted. In the garments a distinction seems possible. On the Acropolis statues (see Plate) the undergarment, which only shows on the shoulder and about the feet, often receives a solid color. On the other garments only the borders or embroidery is marked out by color. The artist seems to have desired to avoid large masses of color, unless the conditions were such that a mass of color would form an effective contrast to the marble. In reliefs color is freely employed for details, and many accessories are rendered entirely in this way, especially in the earlier art, while in the Hellenistic period we find very low relief employed to assist the painter. The Greek attitude towards the use of color was very different from that which now prevails; but the statues from the Acropolis and the beautifully tinted Alexander sarcophagus at Constantinople show that Greek taste in this regard was at least as good as our own. Consult the article "Pictura," in Smith, *A Dictionary of Greek and Roman Antiquities*, vol. ii (3d ed., London, 1891), and the article "Polychromie," in Baumeister, *Denkmäler des klassischen Altertums*, vol. ii (Munich, 1889).

HISTORY

In sketching the history of Greek art, it is convenient to distinguish the following periods (see ARCHÆOLOGY):

I. The Archaic Period, extending to about 480 B.C., the era of the Persian wars.

II. The Attic Period, from about 480 to 323 B.C., during which the centre of Greek life is Athens.

III. The Hellenistic Period, which ends with the Roman Conquest (146 B.C.).

IV. The Roman Period, which may be extended to the foundation of Constantinople (330 A.D.), though constructive Greek art ceased long before 330 A.D.

These divisions are in their nature arbitrary, and no sharp line divides one from the other.

I. **The Archaic Period** (till 480 B.C.). This period may be conveniently divided into two parts: (*a*) The era of the formation of types and schools, and (*b*) the period of developed archaism, from about 550 to 480 B.C.

(*a*) *Formative Period.*—The earliest Doric temples and other monuments of Greek art do not belong much before the year 700 B.C., unless Professor Dörpfeld is right in assigning the Heræum at Olympia to a date not far from 1000 B.C. The evidence concerning the Heræum is very uncertain; but, even if it is accepted, the building stands alone. (Consult Baedeker, *Greece*, pp. lxxiv–lxxv, 296–297, 4th Eng. ed., Leipzig, 1909.) The earliest sculptures in the round are probably not earlier than 650 B.C., though here any positive date is unattainable. All the evidence shows that the artists were not confined to any one part of Greece, but that a general activity developed throughout the Greek world, using much the same types, but treating them with certain differences. Much has already been accomplished in distinguishing the several local schools and identifying their products. Their characteristics, however, are so dependent on details that their discussion lies outside the scope of this article, and it will be more convenient to consider the works with reference to types rather than to schools.

Statues may be male or female, draped or nude, standing or seated. An examination of the monuments shows that not all the possible variations were adopted by these early artists. The standing figure, if male, is usually nude; if female, draped; the seated figures are generally clothed. The male standing figure bears a striking resemblance to the Egyptian statues in its pose, and the suggestion for them may have come from Egypt, with which the Greeks of the seventh century carried on an active trade; but the Greek artist, even at first, is no mere copyist, but endeavors to embody in the traditional form his own observations. The early statues—the so-called "Apollo" statues—stand firmly on both feet, with the left foot advanced and the arms close to the sides. Little by little we may observe greater freedom (the arms are worked free from the body, though the hands are still pressed to the thighs), and a greater care in modeling, which seeks to bring out the muscles and the bones, is manifest. Later in the period the type is modified, as in such a figure as the "Calf-Bearer" of the Acropolis, where the position of the hands has been completely altered, and the artist is fast freeing himself from some of the established conventionalities. The draped female statues are scarcely more, at first, than slabs of stone carved into a rude outline of the human form. The head and long locks of hair, the arms at the sides, and the two feet side by side, just showing beneath the long robe, are the only details attempted. The body is clothed in a long garment, girded at the waist and hanging perfectly straight to the feet. Probably color indicated detail that has now disappeared. A good example is the statue of a woman dedicated by Nicandra to Artemis, at Delos. Later, more care is used in the treatment of the drapery, and the style begins which is best represented in the sixth century by the Acropolis "Maidens" (*κόραι*). The seated draped figures are best represented by the figures from Branchidæ (q.v.) in the British Museum. Draped in large mantles, whose stiff folds are barely indicated in low relief, their hands resting on their knees, they sit in their high-backed thrones, without life or dignity, though recalling in their pose some of the earlier Babylonian work.

While sculpture in the round is developing through modifications of stereotyped forms, a greater advance seems to have been made in reliefs, especially in those of an architectural character. These are typified by the metopes of the oldest temple of Selinus (q.v.), in Sicily, which, in spite of their ugliness, at least show some freedom in design. Even more interesting, though no more beautiful, are the remains of pediments in "poros" stone found on the Acropolis, belonging in part, at least, to a sixth-century temple of Athena. They are among the earliest specimens of Attic art and show it even then possessing characteristics of its own. Among these is the heavy build of the figures, which appears also in the "Calf-Bearer," and seems to cling to the Athenian school throughout the sixth century, if not longer. (Consult D'Ooge, *The Acropolis of Athens,* New York, 1908.) At the very end of this period a work survives which can at least be dated approximately—viz., the great temple of Artemis at Ephesus, which was rebuilt during the reign of Crœsus (560–546 B.C.). The Ionic columns of this temple were adorned with sculptures in relief upon the lower drum, some of the fragments of which are now in the British Museum. They show an advanced technique and give promise of high future development. See DIANA, TEMPLE OF.

(*b*) *Developed Archaism.*—With the period of developed archaism come the beginnings of real beauty and charm in the products of Greek sculpture. True, there are still serious technical defects, but the artists are fast emerging from the trammels of formalism and already show much simplicity and devotion, combined with a true Greek grace and sense of proportion. The nude male type still clings to the old position, but the artist is now able to render the muscles better, to free the arms from the sides, and give some expression to the face. It is, however, in the draped female statue that the greatest advance is made, apparently by the Ionian artists of the Cyclades, especially of Chios. They developed the deep cutting of the folds of the drapery, and the change which this brought about is well indicated in the important series of statues discovered on the Acropolis of Athens. The general pose is the same in most of the series. The figure rests squarely on both feet, one of which is slightly advanced. One arm is bent at the elbow, and the extended hand probably held a patera or flower. The other arm hangs at the side, and the hand draws up the long skirt, thus giving an opportunity for the introduction of diagonal folds to relieve the perpendicular lines. The drapery, which varies somewhat in the different figures, is carefully worked out and given much detail by the free employment of color. For the face in general not much can be said; the eyes and mouth still cause the artist trouble, and his attempts to secure expression too often produce only the exaggerations of the "archaic smile." At the end of the period, however, the skill of the artist has so far increased as to give us the beautiful heads of a boy and a girl, which in dignity and sweetness of expression compare favorably with many products of a later age.

In these female figures a close analysis can detect differences which warrant the belief that some are the work of Chian or island Ionian artists, probably brought to Athens by the tyrants Pisistratus and his sons; while others, such as the statue by Antenor (q.v.), seem to show, in their somewhat heavy build and plainness of conception, which holds aloof from overelaboration and excess of ornament, the work of the native Attic school, which had taken up the refinements and improvements of the newcomers, but without loss of its earlier characteristics. To the same native school must belong the figures of Athena and a fallen giant from the old temple of Athena on the Acropolis. Interesting examples of the work of the Ionian schools have been found at Delphi, where the treasuries of Cnidos (recently restored by the French) and Siphnos show the adaptation of the female type to a new use in Greek architecture. The columns between the antæ of these buildings were formed of a lofty base on which stood a draped figure bearing on her head a lofty "polos," or headdress, which served as the capital, and furnished a suitable transition from the perpendicular lines of the column to the horizontal lines of the roof.

In general, the works of this period have not yet been classified in a thoroughly satisfactory manner. It seems clear that there were flourishing schools of sculpture in Asia Minor, Chios, Paros, and Naxos, and of bronze workers at Ægina and Argos, while at Athens there is a school with a well-defined local tradition. The study of the present is largely an endeavor to analyze minutely each new work and in this way to determine the characteristics of the different schools. This task is complicated by the cross currents of influence which tended to obliterate local differences and produce a thoroughly national type of art. On some of the characteristics of this early art, consult Lange, *Die Darstellung des Menschen in der alteren griechischen Kunst* (Ger. trans. from the Danish, Strassburg, 1899), and Lermann, *Altgriechische Plastik* (Munich, 1907).

II. The Attic Period (480–323 B.C.). The Persian wars gave a tremendous impulse to Hellenic life, especially in the field of art. By the end of the archaic period the sculptor had obtained a mastery over his material, which enabled him to strive for new effects, and finally to produce the most perfect specimens of ancient art. This period may be divided into three parts: (*a*) the transitional period, extending to about the middle of the fifth century; (*b*) the age of Phidias and his immediate followers, ending with the century; (*c*) the age of Praxiteles and Scopas, which may be considered to end with the death of Alexander. (*a*) *Transitional Period.*—The works of the transition still show the traces of the archaic period and the uncertainty as to some of the limits of the sculptor's art. In this period belong probably the Æginetan sculptures (q.v.), and certainly those of the temple of Zeus at Olympia (q.v.), and the metopes of the later temples at Selinus (q.v.); but original works are few, and we are largely dependent upon more or less certainly identifiable copies in marble of the bronze statues of the masters. Of these few originals one of the best—indeed, the finest example of an ancient bronze statue—is the charioteer of Delphi, part of the group dedicated to the god by Polyzelus, brother of Hiero, Tyrant of Syracuse, between 478 and 472 B.C., in consequence of a victory in the Pythian games. Full of grace and charm, yet with a trace of archaic hardness still visible, this work of an unknown artist conveys some suggestion of the qualities that must have marked the work of the great masters. For photographs of this statue and a discussion of it, consult E. A. Gardner, *Six Greek Sculptors* (London, 1910).

The development of the artists of this period was much helped by the growing demand for statues of the victorious athletes, which were frequently dedicated at Olympia and the seats of the great games. The influence of the palæstra, or wrestling school, on Greek art has been often discussed and in certain directions can scarcely be overestimated. Here the artist was enabled to see the perfectly developed human form to the best advantage, while the whole people became familiar with living beauty. The sculptor was furnished at once with the best models, and intelligent and appreciative judges of his work. To this period belong Calamis, famous for his Attic grace; Pythagoras of Rhegium, whose statues of athletes were especially celebrated; and above all Myron, whose "Discobolus" (q.v.) shows at once the skill and daring of the artist, who chose to fix the athlete at the height of his endeavor, and also the deficient grasp of the real limits of his material, which is not adapted for the permanent rendering of a transitory condition. Lastly may be mentioned the charming bronze, possibly a Greek original, now in the Palazzo dei Conservatori in Rome. It represents a boy drawing a thorn from his foot, and, as has been well said by Tarbell, "might be regarded as an epitome of the artistic spirit and capacity of the age."

(*b*) *Age of Phidias.*—In passing to the age of Phidias we come at once into the full splendor of Greek art in its noblest form. It was the time when great works were planned and executed, for the most part in honor of the gods, for the great buildings are temples, and the great statues are their adornment. Thus, at Athens we have the whole series of buildings on the Acropolis, the Parthenon, the Propylæa, the Erechtheum, and the little temple of Athene Nike (see NIKE APTEROS), and in the lower city the so-called Theseum, still the most perfectly preserved of the ancient temples; at Rhamnus the temple of Nemesis, with the statue of Agoracritus, which some attributed to Phidias; at Sunium the temple of Poseidon; at Eleusis the great hall of the mysteries, the work of Ictinus, the architect of the Parthenon; at Argos the new temple of Hera, with its chryselephantine statue of the goddess by Polyclitus; and the temple of Apollo at Phigaleia, another work of Ictinus. (See PHIGALIA; PHIGALIAN MARBLES.) Among the artists, besides the great names of Phidias of Athens and Polyclitus (q.v.) of Argos, are Agoracritus (q.v.) of Paros, the favorite pupil of Phidias; Alcamenes (q.v.), the sculptor of the famous "Aphrodite in the Gardens"; Cresilas (q.v.) of Cydonia, in Crete, to whom is attributed with great probability the original of the portrait busts of Pericles in the Vatican and the British Museum; and Pæonios of Mende, whose flying "Nike" (Victory) at Olympia shows the solution of a problem which had long perplexed the Greek artists.

Through the best work of this period runs the spirit of self-restraint; the work is not for the display of technical skill, though every line shows the sureness of the artist's touch, but for the embodiment of a high ideal. In this nobility of conception lies the great superiority of this period over the ages that follow. Less full of grace and variety of expression, the works of the latter half of the fifth century show a loftier moral tone and greater elevation of feeling. Nor is this wholly confined to the great works. The delicacy and simplicity of Greek art are seen even in the work of artisans, such as carved the great majority of the Attic tombstones. The technique of these monuments is often faulty, but the good taste is unfailing. The deceased is represented as in daily life, alone or in the family circle; there is no direct suggestion of the grave, though in some of the later monuments of this class there seems to be a suggestion of melancholy in the attitude and expression; notably is this the case in a stone of the fourth century, in the style of Scopas, which seems to commemorate a young man mourned by his father and a little slave. The questions of interpretation to which this class of monuments has given rise are too numerous and intricate to be here discussed; nor is their settlement necessary to the appreciation of the merit of one of the most interesting and attractive products of Greek art.

(*c*) *Age of Praxiteles and Scopas.*—With the fourth century we pass from the era of great state undertakings and enter the field of the individual. Not only do the personal characteristics of the artists seem to become more marked, but the works are more frequently the result of private munificence. The style of the sculpture shows the continuance of the two great schools of Athens and Argos, Praxiteles (q.v.) being the chief representative of the former and Scopas (q.v.) of the latter; but the points of divergence are not so strongly marked, and the differences in many cases may quite as well be assigned to the personality of the artist as to the tendency of the school. In the choice of subjects and their treatment the same individuality is prominent. The earlier group of artists had idealized even their portraits, and in their statues of divinities, whether gods or heroes, had given what seemed like a final form to the loftiest aspirations of the popular religion. The religious beliefs of the fourth century were not so deeply rooted, nor was the general ethical standard so high as in the previous period; moreover, it was needful for the artist to seek a fresh point of view if he was to be other than a mere imitator, and this was found in a presentation of those traits which were more directly individual. This is especially marked in portraiture, which in the work of Demetrius (q.v.) of Alopeke in Attica became realistic in every detail, and the art of Silanion, famous for his statues of living men, seems to represent the same tendency as does Parrhasius in painting—the depiction of men as they lived. This tendency to individualize influenced also the statues of the gods, which are shown by a Scopas or a Praxiteles less in their ideal perfection than in momentary and varying moods. They are more like men, and it is the desire of the artist to bring out the finer distinctions of personality which entered into the conception of the gods. This leads to an increased effort to render expression and personality in the features; in this Scopas far outstripped his predecessors. The mutilated heads from Tegea and the good copies of the "Meleager" show how, by concentrating his effort on certain parts of the face, the most intense energy and emotion could be brought home to the spectator without any painful distortion of the features. This endeavor to convey certain impressions to the spectator leads the artist to greater care in the finer points of rendering the texture of the skin, the play of the muscles, the folds and quality of the drapery; the "Hermes" of Praxiteles is an example of the mastery of technique attained by a great artist. In all this tendency to realism, and sometimes towards sentimentalism, the high standards of the past and the Greek worship of moderation, which had not yet passed away, kept the greater artists within bounds, and we seldom find the extremes which became too common in a later age.

In architecture this period sees the development of the great stone theatres, such as that designed by the younger Polyclitus for the sanctuary of Asclepius at Epidaurus (q.v.), and the theatre of Dionysus at Athens, which was probably rebuilt near the end of the period by the statesman Lycurgus. (See DIONYSUS, THEATRE OF.) Other buildings on which the great sculptors labored were the temple of Asclepius at Epidaurus, with a cult statue made by Thrasymedes of Paos and acroteria and pediments designed by Timotheus; the temple of Athene Alea at Tegea, built and supplied with pediment sculptures by Scopas; and, above all, the Mausoleum (q.v.), the funeral monument of Mausolus, Satrap of Caria, which was decorated with a multitude of reliefs and statues by the four artists, Praxiteles, Scopas, Timotheus, and Bryaxis. The rebuilding of the great temple of Ephesus also furnished Scopas an opportunity to display his skill on one of the new sculptured bases for the columns. One base of this temple is now in the British Museum. The scene has never been satisfactorily explained, though it is commonly referred to the story of Alcestis (see ADMETUS); but its style shows close affinity to that of Scopas, though it is scarcely probable that it is a work of his chisel. Among the other works of this period attention should be called to the beautiful "Demeter" from Cnidos, now in the British Museum, which has been claimed for both Praxiteles and Scopas, and the famous "Niobe" (q.v.) group at Florence, a collection of Roman copies of a lost Greek original of this time. Pliny tells us that there was a difference of opinion as to whether a certain "Niobe" group was by Scopas or Praxiteles; but if these statues go back to the original which Pliny had in mind, which is doubtful, it seems likely that Scopas was its author.

III. **The Hellenistic Period** (323–146 B.C.). In entering upon this age we pass into a new phase of Greek art. The conquests of Alexander had opened the East to Greek rulers, Greek thought, Greek life, and had at the same time abolished the old supremacy of the cities of Greece. It is true that Athens still preserves a shadow of her former primacy; but the chief seats of art are now in Asia or Egypt, and the great schools which can be distinguished are those of Alexandria, Pergamus, and Rhodes. This change in the centres, however, is due to a still greater change in the artistic attitude and tradition. The great works of Greece had been completed, and the new Greek centres were now the scene of activity. These new works, however, were brought into contrast with the colossal products of the earlier Oriental civilizations, and, moreover, they were under the patronage of wealthy kings, anxious to vie with their predecessors. The earlier Greeks had not in general represented contemporary scenes, unless in an idealized form; but now the minds of men were filled with the wonderful conquests of Alexander and the fierce wars of his successors. Hence a tendency appears to commemorate the deeds of the present in colossal monuments, such as the great battle groups and the altar of Attalus and Eumenes at Pergamus (q.v.), where in fact this tendency seems to have found its most striking expression. (See ALTAR.) There is also another side to this substitution of the great monarchies for the free cities. The citizen, enriched by the new wealth and retiring from public affairs, seeks to beautify his house and gardens. More than ever art is at the service of the individual, and the taste of the patron determined the subject of the artist. The bustle and stir of the new age, with its nervous haste and constant change, seems to have produced, as so often, a sentimental reaction in favor of the good old times of innocence and the desire to retreat to nature from the great cities. The bucolic poetry is one expression of this sentiment, and in art, especially that associated with Alexandria, we find a further reflection of this tendency. Genre groups, especially those representing children or country life, are common, and a whole group of monuments, the so-called "Hellenistic reliefs," intended for insertion in walls in place of paintings, brings before us a number of these scenes, worked out with the most painstaking devotion to details, especially in the rendering of the accessories and background. (Consult Schreiber, *Brunnen Reliefs des Palazzo Grimani*, Leipzig, 1888, and *Hellenistische Reliefbilder*, ib., 1889.) For, while for the earlier artist the human figure had been of chief interest, and the background had been barely indicated or even entirely neglected, now in many cases the human figure is merely an incident. In response apparently to popular demand, art lends itself to themes hitherto but little treated; the trivial, fantastic, comic, and licentious all enter freely into the lesser products of this age. Not that all this art is to be condemned. Portraiture attained high excellence, and many of the lesser works, especially the beautiful terra-cotta figurines, show a delicacy and refinement of sentiment and a naturalness of conception which render them altogether pleasing. The technical skill of the artists is at its height, and their careful studies of anatomy bear fruit in astonishing accuracy in the rendering of details, which compels admiration even when their sensationalism calls for censure.

At the beginning of this period stands Lysippus of Sicyon (q.v.), the last of the great artists of the mother country whose personality is known to us, and who was regarded by his pupils and contemporaries as the culmination of artistic history. It is necessary to call attention here to his peculiar position as an artist who seems to have combined much of the Attic grace in conception with the careful attention to proportion, and to the technical side of bronze casting, which belonged to a successor of Polyclitus as the leader of the Peloponnesian school. His influence was enormous, and much in Hellenistic art is little else than a modification or imitation of his peculiarities. The "Apoxyomenos" of the Vatican has long been the starting point for the study of his art; but a most important addition to our sources has been made in the marble group dedicated by Daochus the Thessalian, representing his ancestors, recently discovered at Delphi, which can scarcely be anything else than a marble copy of a bronze original by Lysippus at Pharsalia. (Consult Homolle, *Bulletin de correspondance hellénique*, xxiii, Paris, 1899.) Other important works of this period are the "Nike of Samothrace," in the Louvre, which shows plainly the survival of the Attic school; the bronze figure of a seated boxer in Rome, where brutal realism is joined with a masterly appreciation of pose and technique; and a number of ideal portraits, in which the artist endeavors to give his conception of the character of the man, like the portraits of Homer, Anacreon, and many anonymous heads, which have often been most arbitrarily named. In Athens there are indications of an endeavor to return to the types of the fifth century, and towards the end of the period a pronounced archaistic imitation of the very early works with their stiff draperies and mincing gait appears. The art of Alexandria seems to have been largely decorative, and that school produced no great artists.

At Pergamus the great victories of Attalus I (241–197 B.C.) were commemorated in a series of colossal statues, of which the "Dying Gaul" of the Capitoline Museum, and the noble group of the "Gaul and his Wife" in the Museo Ludovisi, are the best examples, though there are smaller copies of other figures, which seem to have been replicas of a series at Athens, in many European museums. Eumenes II (197–159 B.C.), in his erection of the great altar (see PERGAMUS), led the Pergamene art to one of its most characteristic works. The enormous extent of surface (about 400 feet long and 7½ high), and the tumultuous character which must necessarily belong to any representation of the "Battle of the Gods and Giants," gave the artists full scope for the display of variety in imagination and technical skill in composition and execution. Though devoid of the calm simplicity desirable in monumental sculpture and characteristic of the best Greek work, the tremendous energy and the boldness of conception make the altar frieze one of the notable monuments of the world. The tendencies of the Pergamene school seem to have been continued at Rhodes, where early in the Roman Period, or possibly earlier, was produced the famous Laocoön (q.v.) group, a work in which the realistic representation of physical suffering reaches its highest point—a group that has been extravagantly praised and unstintedly condemned. The subject is unfitted for artistic use, but the artists have treated it with a wonderful command of technique.

IV. The Roman Period (136 B.C.–330 A.D.). This period may be briefly dismissed, as it is not in general an age of artistic originality, except in the works of Roman architecture and the marvelous accuracy of Roman portraiture. Greek art was known to the Romans through the wholesale plundering of the eastern world for the decoration of Roman temples, palaces, and villas. It is the age of copies, when many of the works which fill our museums were executed—some of them by direct transference of the original through the aid of accurate measurements, as is shown by the *punctilli* still existing on many statues which were left by the sculptor to aid him in his work. Many more are free imitations and reproductions, such as mark the works of the school of Pasiteles, who sought his models in the early fifth century, and whose pupil Stephanus produced a nude youth which is obviously inspired by the Argive school associated with the name of Ageladas, and which became so popular that we find it combined with other figures, as in the group of "Orestes and Electra" at Naples. Another example is the "Venus Genetrix" of Arcesilaus, which is almost certainly a reproduction of the "Aphrodite in the Gardens" of Alcamenes. So, too, the "Venus de Medici" is a probably debased and sensualized version of the "Cnidian Aphrodite" of Praxiteles.

PAINTING

It was in Greece that ancient painting, like other forms of art, reached its highest development, in the fifth and fourth centuries B.C. Not that skillful fresco painting had not been common earlier. The fragments from Tiryns, and still more the splendid decorations from Cnossus in Crete, show that the Mycenæan age (about 1500–1200 B.C.) possessed much of the technical skill of the Egyptian artist and far greater freedom and originality. With the fall, however, of Ægean civilization, we lose all examples of painting properly so called, though the vases enable us to trace the progress of drawing, and the statues and remains of buildings show how extensively color was employed as an auxiliary to the sister arts of sculpture and architecture. Indeed, this use continued throughout the classical period. There are traditions of Corinthian and Sicyonian painters, who drew outlines on walls or whitened tablets of clay by the aid of shadows, and indicated details by a few lines, but used only one color. There are also records of paintings which would carry back the art into the eighth century. Eumares of Athens is said to have distinguished the sexes, probably by the use of different colors, in distinction from the early monochrome artists, and Cimon of Cleonæ to have introduced correct drawing in profile, probably of the eye, and variety in the direction of the glance. These artists, who have some claim to be considered real persons, must have lived about the middle or end of the sixth century.

Fifth Century. In the great outburst of Greek genius which followed the Persian wars, and which centred in Athens, painting rose to an equality with sculpture. This advance is directly connected with Polygnotus (q.v.) of Thasos, whom Theophrastus describes as the discoverer of the art. His works were large scenes covering the walls of public buildings, such as the "Painted Portico" at Athens and the "Lesche of the Cnidians" at Delphi. In general his subjects were mythological, but his contemporaries and fellow workers Micon and Panænus, brother of Phidias, seem to have treated also events in recent history. At this time painting, like sculpture, is found in the service of the state for the decoration of public buildings and temples. As to the style of these artists, it was purely decorative, without perspective and treatment of light and shade. The figures were on different levels, and there was some indication of broken ground. Polygnotus' palette, we are told, contained only black, white, yellow, and red, with which he succeeded, however, in producing a variety of shades. In spite of the flat color Polygnotus was famed for his fine composition, dignity, and perfection of characterization, and severe yet expressive drawing.

The most important advance was made shortly after by the scene painter Agatharchus of Samos, who discovered some of the applications of perspective and shading. His book on his new discoveries led the philosophers Anaxagoras and Democritus to serious investigation of the laws of perspective. The new methods were transferred from the large surfaces to panels by Apollodorus of Athens, and thus within a century the way was fairly cleared for a growth of the art beyond all that the Egyptians had achieved in 3000 years. The school which now arose, about the end of the fifth century, is commonly called the Asiatic or Ionic school, and is best represented by the two great rivals Zeuxis (q.v.) of Heraclea and Parrhasius (q.v.) of Ephesus. The former was famed for his truthful and even deceptive reproduction of nature, and the latter for his delicate drawing, but both must have been masters of chiaroscuro, if any reliance can be placed in the comments that have survived. To this school also belonged Timanthes of Cythnos, famous for the variety and depth of facial expression.

Fourth Century. In the early fourth century B.C. the centre of painting seems to have been at Sicyon, where Timanthes lived late in life. Its founder was Eupompus, who was succeeded by Pamphilus (q.v.) and Melanthius, who laid great stress on systematic instruction, especially in drawing, which was introduced into the schools of the city. A pupil of the school, Pausias, perfected the encaustic painting (q.v.), which, however, did not drive out the old tempera (q.v.) process. How far the school had advanced in handling of light and shade may be judged from the praise given the black ox of Pausias. In the second quarter of the fourth century a school of Theban and Attic artists arose who seem to have given especial attention to pathos, and whose favorite subjects were battle pieces. The tendency away from the severe and lofty, which is found in sculpture, also manifested itself in painting, and many of these artists are also credited with genre scenes, flower pieces, and trifling subjects. In contrast to this tendency Nicias of Athens, who seems to have survived Alexander, insisted on the importance of great subjects. It seems very probable that the release of Io by Hermes, in the "House of Livia" on the Palatine Hill in Rome, is a copy of one of his works. The highest technical skill and artistic merit were claimed by the ancients for the two great masters of the younger Ionian school, Apelles of Ephesus and Protogenes of Caunus—the former famed for his grace, the latter for his painstaking, which in the opinion of some led him to weaken the spontaneity of his pictures. The paintings in the Etruscan tombs, though undoubtedly influenced by Greek models, are far too rude to serve as standards of reconstruction, and most of them are not later than the middle of the fourth century. Of more value is a sarcophagus from Corneto, now in Florence, on which is painted in tempera a wonderfully vigorous battle of the Greeks and Amazons, probably the work of an Etruscan artist of the early third century B.C., but evidently a close copy of a Greek model, which must have ranked in beauty and power little below the works of the best period.

Hellenistic Period. This age shows in painting, as in sculpture, two tendencies. One was towards the rendering of mythical scenes, which afforded opportunity for pathetic or tragic expression, as in the famous picture of Timomachus of Byzantium, representing Medea meditating the slaughter of her children, of which some reminiscences seem preserved in Pompeian paintings. On the other hand, many painters seem to have preferred lighter themes. They also rendered the landscape with pleasure, and even experimented with effects of artificial light, as in a painting of a boy blowing a fire. Often the choice is low, and triviality, not to say sensuality, is a prominent characteristic. The walls of Pompeii furnish abundant examples of these tendencies. It is only from this late period of Hellenistic art that many works have come down to us. In Rome are the "Aldobrandini Marriage," a series of landscapes illustrating the *Odyssey*, and a rather poor series of panels representing victims of unnatural love, while the baths, palaces, and tombs have from time to time yielded others, many of which have now perished. Among these the first place must be given to those from the Farnesina Gardens, some of which recall the best Athenian lecythi of the fourth century. The largest number are, however, from the buried cities of Pompeii and Herculaneum, preserved, for the most part, in the Museum of Naples. Of especial value are the encaustic portraits of the second century A.D., discovered in the Fayum, Egypt, where they were used to cover the faces of mummies. The Metropolitan Museum, New York, possesses a series of frescoes from Boscoreale, near Pompeii, and a very important collection of portraits from the Fayum.

Roman Painting. A mere appendix to the Greek, Roman painting developed little originality. It is decorative in character and will be found treated under ROMAN ART.

THE DECORATIVE ARTS

The artistic instinct of the Greeks pervaded every phase of their life to an extent inconceivable to a more utilitarian age. The spirit of the artist inspired also the handicraftsman, who brought articles of daily use and adornment in which the beautiful and the useful were indissolubly united, and which were in themselves works of art. To discuss the many branches of applied art in which the Greeks excelled is not within the scope of the present article. A general survey will be found in the article Decorative Art, and a more extensive treatment under such titles as Costume, Furniture, Interior Decoration, Jewelry, Plate, Gems, Cameo Ring, Earring, etc. Attention is given to Greek ceramics in the article Pottery and particularly Vase, in which both the graceful forms as well as the unsurpassed decoration of Greek vases (usually called "Vase Painting") are noticed in some detail.

BIBLIOGRAPHY AND SOURCES

The sources of our knowledge of Greek art are twofold—the extant remains and the literary tradition. The monuments are, of course, the basis of all discussion of questions of style and technique; but their value is limited in the field of architecture by the ruined condition to which most ancient buildings have been reduced; while in sculpture the vast majority of the statues which fill the museums are copies of a later age, from which the style of the great masters must be extracted by careful and extensive comparisons, in which the influence of subjective criticism must necessarily be prominent. For the history of Greek art it is necessary to turn to the documentary evidence as preserved in inscriptions, which include the signatures of artists and the records of the erection of notable buildings, or in the writings of the ancients; and as these are in general late compilations, it follows that precision is sadly lacking on many points, and that our knowledge of the individual artists rests more often on skillful combinations than on positive evidence. One reason for this is the attitude of the Greeks themselves towards artists during the fifth and fourth centuries B.C. In general, while the work was highly valued, the artist was an object of little interest. This was due to the low esteem in which the artisan was held (little or no distinction was made between artisan and artist), as one whose confining labor hindered him from serving the state or cultivating his body or mind. Consequently, when in the third century B.C. interest in the personality of the great artists of the past arose, information was not always attainable.

The earliest treatises on art are naturally technical rather than historical. The Argive sculptor Polyclitus in his *Canon* discussed the correct proportions of the human form, and Ictinus, the architect of the Parthenon, wrote a technical description of his masterpiece. Not until the early part of the third century does a history of the earlier art appear. Xenocrates, an artist of the Sicyonian school, seems to have prepared a critical study of the great sculptors from the time of Phidias, in which he aimed to show that perfection had been reached only with Lysippus of Sicyon. A chronological arrangement was probably no part of his scheme, and it is not certain that he gave any account of the predecessors of Phidias, whom he chose to regard as the real founder of plastic art. At Pergamus the history of Greek art and the chronology and characteristics of the artists were worked out by such writers as Antigonus of Carystus and Polemon, often from very uncertain evidence and with not a little freedom of combination. The writings of these men have perished, but their views have been preserved in the *Natural History* of Pliny the Elder and the *Description of Greece* by the traveler Pausanias, as well as by later lexicographers and scholiasts. The testimony of the classical writers to the history of art has been collected by J. Overbeck, *Antike Schriftquellen zur Geschichte der bildenden Künste bei den Griechen* (Leipzig, 1868), and by H. Stuart Jones, *Select Passages from Ancient Writers Illustrative of the History of Greek Sculpture* (London, 1895), containing also an English translation and commentary. There is an extensive literature dealing with the historical studies of the ancients and the sources of the extant writers, which is conveniently summarized in Jex-Blake and Sellars, *The Elder Pliny's Chapters on the History of Art* (London, 1896). This book contains the text of Pliny, so far as it bears on the history of art, with translation and commentary, and introduction discussing the sources, and a good bibliography. The signatures of the Greek artists were collected by Loewy, *Inschriften griechischer Bildhauer* (Leipzig, 1885); but this work needs supplementing, as many more are now known. For architecture, the only surviving literary source is the work of Vitruvius (q.v.), a practical architect of the time of Augustus, who drew from lost Greek writers, whom he sometimes misunderstood and mistranslated.

General Works. Although the importance of both monumental and literary evidence has always been recognized, it is only in recent years that systematic endeavors have been made to correlate these sources and, by a comparison of extant works with the descriptions of the literature, to determine with approximate certainty the characteristics of the various schools and, within certain limits, the artists of the originals from which our copies were made. The modern histories begin with the epoch-making work of Winckelmann (q.v.), in which the periods of rise and decline in Greek art were first clearly defined. This and other works published before the middle of the nineteenth century have now chiefly an historical importance, as the discoveries of recent years have vastly increased the material and revolutionized many of the earlier views. For the lives of the artists, the fundamental works are Brunn's *Geschichte der griechischen Künstler* (Brunswick; 2d ed., Stuttgart, 1889), and Thieme and Becker, *Allgemeines Lexikon der Bildenen Künstler* (9 vols., Leipzig, 1913). The best brief work, perhaps, is Tarbell's *History of Greek Art* (New York, 1896). A standard work of the old school is Overbeck's *Geschichte der griechischen Plastik* (4th ed., Leipzig, 1893–94), which suffers chiefly from the separation of the monuments and the literature. Probably the best history at present is Collignon's *Histoire de la sculpture grecque* (Paris, 1892–97). Other good works are: Reber, *History of Ancient Art*, trans. by J. T. Clark (New York, 1882); Tarbell, *History of Greek Art* (ib., 1896); E. A. Gardner, *Handbook of Greek Art* (ib., 1905); Walters, *The Art of the Greeks* (ib., 1906); Springer, *Handbuch der Kunstgeschichte: das Alterthum*, 6th ed. by Michaelis (Leipzig, 1900); P. Gardner, *The Principles of Greek Art* (New York, 1914); Powers, *The Message of Greek Art* (ib., 1913). The great work of Perrot and Chipiez, *Histoire de l'art dans l'antiquité* (Paris, 1881–1903), has reached in vol. vii only the early archaic period and the development of the temple in

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GREEK CHURCH, THE. In the widest sense of the term, all those Christians following the Greek or Greco-Slavonic rite. They agree in receiving the first seven general councils of the Catholic church, but reject the supremacy of the Roman Pontiff and all the later councils of the Western church. The Greek church calls itself "the Holy Orthodox Catholic and Apostolic Church." It includes three important branches—the church within the Ottoman Empire, subject directly to the Patriarch of Constantinople; the church in the Kingdom of Greece, ruled by the Holy Synod of Greece; and the Russo-Greek church, in the Russian Empire, ruled by the Russian Holy Synod under the authority of the Czar. There are, besides, the churches of Rumania and Servia, which no longer recognize the authority of the Patriarch of Constantinople, and the Bulgarian church, which has been independent since the Berlin Congress in 1878, and several smaller independent churches: Cyprus, Alexandria, Sinai, Montenegro, Antioch, and Jerusalem.

The tendency to make ecclesiastical dignity and authority follow political importance was noted early in the East. As a result of this, the see of Jerusalem was at first only an ordinary bishopric under the Metropolitan of Cæsarea. Slight differences between Oriental and Occidental churches manifested themselves even during the first century. The Greek language was used in the religious services of the East, the Latin in the West. Certain unimportant liturgical differences arose, though the unity of faith was not affected thereby. In the West the Pope gradually became the sole Patriarch; in the East there were at first three patriarchs—those of Constantinople, Antioch, and Alexandria—and in 451 Jerusalem also became a patriarchate. The history of the Greek church as a separate body dates from the commencement of the efforts on the part of the church of Constantinople to establish for itself a distinct jurisdiction and an independent primacy in the eastern division of the Empire. The ecclesiastical preëminence of Constantinople followed upon the political distinction to which it rose as the seat of the Imperial government. Originally Byzantium was but a simple episcopal see, subject to the Metropolitan of Heraclea. The rank of the see rose with the fortunes of the city, but there are many early instances in which questions arising within the district which afterward became the patriarchate of Constantinople, questions affecting the Bishop himself, and even his relations to other patriarchs of the Oriental church, were referred to the bishops of Rome. It was not long, however, before the political rivalries of East and West revealed a certain lack of harmony between Rome and Constantinople. The Council of Chalcedon (451) passed a decree which confirmed the precedence of Constantinople, and assigned to its Patriarch not only an extensive range of jurisdiction, but grounded these ecclesiastical privileges, in the case of the new as in that of the old Rome, upon the political precedence to which both had risen. The Roman legates protested against this canon. The consequence was a serious misunderstanding between the two churches, which was widened by certain doctrinal differences in some of the christological controversies. This culminated some 30 years later when the Emperor Zeno, in 482, issued the *Henoticon*, a decree meant to reconcile the Monophysites (q.v.). This decree carefully avoided mention of the formula of the two natures in Christ, which had been adopted at the Council of Chalcedon. The *Henoticon* was accepted by the patriarchs of Constantinople and Alexandria, who, as a consequence, were, with the Emperor, excommunicated by Pope Felix III in 484. This is the first Eastern schism, and the Eastern and Western churches were actually separated for a period of about 35 years. The terms upon which the excommunication was withdrawn by Pope Hormisdas in 519 involved a complete acknowledgment of the exclusive supremacy of the Roman Pontiff. The Council in Trullo (see QUINISEXT), held in 592, caused a renewal of the misunderstanding by various decrees condemning Western ecclesiastical practices. The Patriarch, John the Faster, claimed the title of Ecumenical Patriarch, i.e., Bishop of the Universal Church, towards the end of the sixth century. His claim was reprobated by Gregory the Great (see GREGORY I), but the pretension was not entirely abandoned. Finally the foundation of the Western Empire, in close relations with the Pope, completed political separation, and the rivalry of Patriarch and Pope tended to the separation of the churches.

Photius (q.v.), an energetic and learned man, was raised to the patriarchate by the Emperor while still a layman; he was deposed by Pope Nicholas I in 863. He appealed to the differences between the churches, especially the doctrine of the procession of the Holy Ghost, and the practice of celibacy among the Latin clergy; and, finding supporters, actual schism ensued. Under the next Emperor, Basil, this schism was healed, and though later Photius once more became Patriarch, he was finally banished in 886 by the Emperor Leo the Philosopher. It was almost two centuries before there was another open rupture, though there always remained some insecurity in the relations between Pope and Patriarch. Michael Cerularius addressed a letter to the bishops of Apulia, seeking closer union with the Western church, but mentioning the obstacles, such as the use of unleavened bread at the eucharist and the doctrine of the procession of the Holy Ghost. The letter fell into the hands of Pope Leo IX, who replied with scorn and, after further acrimonious messages, with formal excommunication (July 16, 1054). At last the breach between the two churches was complete. Since then the schism has continued, although many attempts have been made to repair it. In 1098 at a synod held at Bari, by invitation of Pope Urban II, the famous Anselm, Archbishop of Canterbury, stated the doctrine of the procession of the Holy Ghost in the hope of winning back the Greeks, but without effect. The presence of the Crusaders in the East might have been expected to renew sympathy between the churches; but the rapacity and cruelty manifested in the establishment of the Latin Empire at Constantinople widened the breach between East and West. The Greek emperors, partly perhaps to get help from the West against the advancing Moslems, endeavored to bring about Church union. Michael Palæologus (see PALÆOLOGUS) sent ambassadors to the Council of Lyons in 1274, who formally abjured the schism. The bishops refused to ratify the union thus brought about. John Palæologus a century and a half later brought about a reopening of negotiations for union. The Patriarch of Constantinople and a number of Church dignitaries from the East attended the Council of Ferrara-Florence (q.v.), held in 1438–39. All the doctrinal points of difference were discussed, and the Greek churchmen present, with the single exception of Mark, Bishop of Ephesus, formally signed the decrees of the council. The action of the Greek bishops was repudiated by the majority of the Greek clergy. The downfall of the Greek Empire in 1453 obliterated all trace of the reconciliation. A number of attempts have been made by Protestant communions to establish an understanding with the Greek church. Melanchthon addressed a letter to the Patriarch Joseph of Constantinople, through a deacon of the church, who visited Germany in 1558. Two well-known Tübingen divines, Andreæ and Crusius, visited Constantinople during the patriarchate of Jeremias (1576–81). Both missions were unsuccessful. In the following century the celebrated Cyril Lucaris (see LUCARIS), who was educated in the West and carried home with him a strong but well-concealed bias towards Protestantism, was elevated to the patriarchate and issued a decidedly Calvinistic confession of faith (1629). This caused Lucaris' deposition and called forth a doctrinal declaration signed by the patriarchs of Constantinople, Alexandria, and Antioch, and many metropolitans and bishops, which stated the Greek positions as against both Protestants and Roman Catholics. This exposition, the author of which was Peter Mogilas, Metropolitan of Kiev, and which was published in 1640, was adopted in a synod held in Jerusalem (1672) as the creed of the Greek church. In 1722 it was published by order of Peter the Great as the authorized formulary of the Russian church.

The doctrinal differences between the Greek and Roman churches consist chiefly in the rejection by the Greeks of the word *Filioque* (q.v.) in the creed, in the interest of the supremacy of the Father in the Trinity; in their rejection of the authority of the Pope, and of the word "purgatory," though they believe in a state of purgation after death and in the efficacy of prayers for the dead. They teach seven sacraments, though the ritual of their administration differs somewhat from the Roman. Baptism is by triple immersion. Confirmation is given with baptism even to infants, and by priests, not bishops exclusively. The Greek church teaches transubstantiation, just as the Latin, and the adoration of the Host, though this has been denied by Protestants. It uses leavened instead of unleavened bread for the sacrament and gives communion in both kinds even to children. Extreme unction has certain special rites and may be given several times during the same illness. There are ritual peculiarities also in the administration of Holy Orders. (See ORDERS, HOLY.) Marriage is allowed to priests and deacons before ordination, and is in some of the churches encouraged. Bishops are required to be celibate and are consequently selected from the monastic orders. Second marriage, however, or marriage with a widow, is not permitted. Prayers to the Blessed Virgin and the saints, whose pictures are exposed for veneration, are common. Graven images are not permitted, except of the Cross, though crucifixes are not used. The sign of the cross is often employed. Instrumental music is not allowed in the churches, but vocal music, by male voices only, is developed to a wonderfully impressive degree. In general the splendor of ceremonial is not inferior to that of the Latin church. The Holy Mysteries are celebrated in a sanctuary entirely separated by a partition from the rest of the church. During Lent, except on Saturdays and Sundays, there is only the mass of the presanctified, as in the Roman church on Good Friday. (See HOLY WEEK.) The people pray standing, facing the east, and kneel only at Pentecost. The Greeks believe firmly in the merit of good works and of self-denial. Monastic institutions have existed in the Greek church from the earliest times, and there are numerous convents of both sexes which follow almost exclusively the rule of St. Basil. This enjoins poverty, chastity, and obedience. The monks are not priests as a rule, but they are bound to recite the Divine Office. They are not permitted by rule to eat meat.

Of the three important divisions of the Greek church, that in the Turkish dominions is under the jurisdiction of the Patriarch of Constantinople, who is the acknowledged superior of the three other patriarchs of Alexandria, Antioch, and Jerusalem. The patriarch is named by the patriarchal community, consisting of the dignitaries, lay and cleric, of the patriarchal household, of the notables and the merchants of the city, and of the heads of corporations. Their choice is limited, however, to one of three candidates, who must be metropolitans, selected by the Holy Synod of bishops. The elect one does not become patriarch until invested by the government, which also has the power to depose. During the nineteenth century many of the patriarchs were deposed for extortion at the request of the synod.

The Greek church in Russia became practically independent by the appointment of a Patriarch of Moscow in 1588. The dignity was subordinate to the Patriarch of Constantinople until the reign of Czar Alexis, father of Peter the Great, when the Patriarch of Moscow, Nikon, refused to acknowledge the jurisdiction of Constantinople. About the year 1700, on the death of the Muscovite Patriarch, Peter the Great would not permit the appointment of another, but allowed the authority to be exercised to a certain extent by a bishop under the name of exarch. After the lapse of 20 years, during which time the people became accustomed to the idea of having no patriarch, a holy synod or governing committee was appointed, over which the Czar has ever since presided. The leading principle, in fact, of the new constitution of the Russian church is the absolute supremacy of the Czar. The Holy Synod is now regarded as one of the departments of the government, the Minister of Public Worship being ex officio a member. To this body, through a bishop, residing in San Francisco and bearing the title of Bishop of Alaska and the Aleutian Islands, the churches of this communion in the United States, which are partly supported by the Russian government, are responsible. There were in 1913 181 of them, with some 133 priests, and 65,000 adherents. Their periodical organ is the *Amerikansky Russky Viestnik* (New York), to which is published in English a monthly *Russian Orthodox American Supplement.*

The Greek church of the Kingdom of Greece originated with the revolution of 1821–29, which made the country independent of Turkey. The new church was organized by a formal decree in 1833. The Patriarch of Constantinople claimed jurisdiction until 1850, when he acknowledged the entire independence of the Greek hierarchy. The government of the church of Greece is modeled on that of the Russian church. Ecclesiastical authority is vested in a holy synod consisting of five members, usually archbishops, or bishops, though exceptionally a monk or a priest may be among the number. This body is supposed to be independent in spiritual affairs, but as its members are appointed by the crown and hold office only for a year, it has become in practice a state instrument. Moreover, two officials of the crown have the right to assist at all deliberations, though without votes. The Holy Synod elects bishops, but the crown has the right of confirmation and investiture. The church of Greece was represented in the United States in 1913 by 80 priests, 70 churches, and 175,000 adherents. Of the Armenian or Turkish church there were in the United States, in 1913, 21 churches, 15 priests, and 55,000 adherents. The Syrian, Servian, Rumanian, and Bulgarian Christians of the Greek rite have together in the United States 63 priests, 59 churches, and over 140,000 adherents. Through immigration all branches of the Greek church in America are growing rapidly. The Eastern church in its various branches is estimated to number about 100,000,000 adherents, of which over 90,000,000 belong to the Russian church. For the bodies which follow in many particulars the Greek usages and liturgy, but are in communion with the Pope, see UNIATES; EASTERN RITE, CHURCHES OF.

Consult the general Church histories, Schaff, Darras, Neander, etc., or Hefele, *Concilien-Geschichte* (Freiburg, 1851–73); Neale, *History of the Holy Eastern Church* (5 vols., London, 1850–73); Dean Stanley, *History of the Eastern Church* (ib., 1861); Silbernagel, *Verfassung und gegenwärtiger Bestand sämmtlicher Kirchen des Orients* (Landshut, 1865); Tozer, *The Church and the Eastern Empire* (London, 1888); Hergenröther, *Monumenta Græca ad Photium Pertinemtia* (Regensburg, 1869); id., *Photius, Patriarch von Constantinopel, sein Leben und seine Schriften* (3 vols., ib., 1867–69); Howard, *The Schism between the Oriental and Western Churches* (London, 1892); Röhan, *L'Eglise orthodoxe gréco-russe* (Brussels, 1897); Gagarin, *The Russian Clergy* (London, 1872); Horton, *Student's History of the Greek Church* (New York, 1902); Pierling, *La Russie et le Saint Siège, études diplomatiques* (Paris, 1896); *Papes et Tsars* (ib., 1890). Pierling is the author of a series of works on the relations between the holy see and the Czar during the sixteenth and seventeenth centuries. Consult also: Fortesque, *The Orthodox Eastern Church* (London, 1907); Adeney, *Greek and Eastern Churches* (New York, 1908); Hamilton, *Greek Saints and their Festivals* (London, 1910); Dampier, *Organization of the Orthodox Eastern Churches* (Milwaukee, 1913). For the creeds of the Greek church, consult Schaff, *Creeds of Christendom,* vols. i, ii (4th ed., New York, 1905), and Curtis, *History of Creeds and Confessions* (Edinburgh, 1911).

GREEK CROSS. See CROSS.

GREEK EDUCATION. See EDUCATION, *Historical Sketch of the Theory of Education.*

GREEK EMPIRE. See BYZANTINE EMPIRE.

GREEK FESTIVALS. Celebrations for the most part in honor of some god, and in their regular recurrence corresponding with the weekly rest day of Jews and Christians. (See FESTIVALS.) Offerings to the gods on the part of the state or individuals were of almost daily occurrence, but of course caused no general cessation of labor. On the other hand, at frequent intervals occurred great celebrations, during which there seems to have been a general suspension of business, both public and private. These festivals were in general local, and their number naturally varied greatly in different places and at different times. The Athenians were famous for the number and splendor of their festivals, while, later, Tarentum was said to have more holidays than working days in her calendar. The tendency seems to have been to increase the number and duration of these occasions, though it may well be doubted whether there was not a decrease in devotion. More and more the games, processions, and feasting at public expense seem to have become the chief attraction. Sacrifices on the part of the state were of course a part of all such solemnities, and frequently the image of the god was carried in solemn procession, but in the details there was a wide difference. Some festivals were attended with athletic contests, or recitations by the rhapsodists; some were the scene of musical or dramatic contests; others were accompanied by rites which are obviously survivals of early popular superstitions, and for which analogies may be found in the folklore of other peoples. Thus, at the festival of Apollo, held in Attica during the month Pyanepsion, which theoretically began about the end of October, cooked beans as a symbol of the fruits of the autumn were offered to the god, and an olive branch, the so-called Eiresione, hung with figs, cakes, and small jars of oil, wine, and honey, was carried through the streets, and suspended from the temple by a boy whose parents were still living. Similar branches were borne by the attending worshipers and were afterward hung at the doors of their houses. (Consult Ogle, "The House-Door in Greek and Roman Religion," in *American Journal of Philology*, xxxii, New York, 1911, and "Laurel in Ancient Religion and Folk-Lore," in *American Journal of Philology*, xxxi, ib., 1910.) A complete list of the Greek festivals does not lie within the scope of this article and may the more easily be omitted as many of them are mere names, about the ceremonies connected with which we have no information. (See Festivals, and the names of various gods, e.g., Juno.) The great national festivals were the Olympian, Pythian, Isthmian, and Nemean, for which see the articles Olympic Games; Pythian Games; Isthmus; Nemea. The great Athenian festival in honor of Athena, which almost attained national rank, is treated under Panathenæa, and the Eleusinia in honor of Demeter are discussed under Mysteries. (See, also, Games, Ancient.) In the remainder of this article a few of the more prominent or interesting of the local festivals will be briefly described, particularly those of Athens, for about them we are best informed. For others see the articles on the various deities and heroes.

The Apaturia occupied three days of Pyanepsion (October), and were not properly a state festival, as they were celebrated by the phratries, in one of which every Athenian citizen was enrolled. On the first day the phratry dined together, on the second sacrifices were offered to Zeus and Athena as tutelary divinities of the phratries, and on the third occurred the most important act of the festival, the reception into the phratry of the children born to its members in lawful wedlock during the previous year. Each father made oath as to the legitimacy of the child and furnished an animal for sacrifice. Boys also seem to have shown their progress in their studies by recitations from the poets. At some time during the festival sacrifices were made to Apollo Patroös, Hephæstus, and probably Dionysus of the black goatskin (μελάναιγις). The celebration of the Apaturia is declared by Herodotus to have been characteristic of all true Ionians, but of the details of the celebration outside of Athens we are not informed. In the month Munychion (April) were celebrated the Delphinia, in honor of Apollo. This festival was connected with the legend of Theseus' voyage to Crete, and as it occurred at the opening of navigation and was marked by a procession of maidens bearing suppliants' branches of the temple of Apollo to entreat his mercy, it seems to have been in the nature of a propitiation of the god, that he might grant favorable weather to seamen. (Consult the article "Delphinia, 2," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. iv, Munich 1901.) A festival of the same name, accompanied by athletic contests, was celebrated at Ægina, and, as Delphinios is the name of a month in many Greek calendars, it is probable it was also celebrated elsewhere. Noteworthy for a curious ceremony were the Dipolia, or Dipolieia, celebrated in honor of Zeus in Scirophorion (June). In the Attic festivals a prominent place was occupied by the Dionysia, in honor of Dionysus. Four festivals in honor of Dionysus can be distinguished, though only two of them are called Dionysia. Their purpose was to wake the sleeping spirit of generation and to render him propitious for the coming of spring and the sowing of the crops. In Poseideon (December) the Lesser or Country Dionysia were celebrated throughout the demes of Attica with every kind of merrymaking and mummery. (See Deme.) A village procession led a goat for sacrifice to the altar of the god, and, with the growth of the drama, plays, which had already been produced in the city, were performed in the country theatres. In the next month (Gamelion) a similar festival, the Lenæa, in honor of Dionysus of the Wine Vat, was celebrated in the city by the King Archon, at which plays were performed and sacrifices offered, so that they extended over several days. The next month, Anthesterion (February), was the time for the celebration of the Anthesteria, which lasted three days. On the first day, the casks of new wine being opened, each family sacrificed, and rejoiced at the coming of the god of wine and spring. The second was the great day, on which the wife of the King Archon visited the ancient temple of Dionysus in Limnæ and after various ceremonies returned to the Boukoleion, which she entered alone to be wedded to the god. The evening was one of wild revelry throughout the city, in which even slaves participated, and seems to have ended in a great drinking bout at which he who first emptied his goblet received a prize. The third day was devoted to the gods of the lower world, and special offerings of the fruits of the earth were cooked for Hermes, conductor of souls to the lower world. There are indications that during this festival the ghosts of the dead were believed to return to the world, and it is certain that the temples of the heavenly gods were closed during the whole festival. It seems therefore that the joyous revelry (which resembled that of the Roman *Saturnalia*) had been added to a celebration of quite a different character. Finally in early spring, in the month Elaphebolion (March), came the Greater or City Dionysia, which was, with the exception of the Panathenæa, the most splendid of the Athenian festivals. On the eve of the first day a solemn procession escorted the statue of the god from his temple to the theatre. The first day was given up to the choral and lyric contests and closed with a great procession of masqueraders. The three following days were filled with the performances of the new tragedies and new comedies, in the presence of an immense throng of citizens and strangers. Before this throng the sons of those who had fallen in battle, on reaching their majority, were presented by the state with shield and spear. The importance of this festival for the development of Greek literature in its most finished and characteristic product, the Attic drama, can scarcely be overestimated. (Consult Haigh, *The Attic Theatre*, 3d ed., Cambridge, 1907.) The 7th of Thargelion (May) was the birthday of Apollo, and in preparation for its celebration a solemn purification was necessary on the 6th. The whole festival was known as the THARGELIA. Like other Greek festivals, it was a union of the solemn and the glad. The first day saw solemn sacrifices to Demeter and the Mœræ, or Fates, and there are indications that even in historical times two human victims were sacrificed to avert the wrath of the god, who sent the summer pestilence. In the fifth century B.C. these victims seem to have been simply driven from the country. The second day saw the glad offering of the first fruits to Apollo, Helios the sun, and the Horæ, or Seasons, through whose care they had ripened. Last may be mentioned the solemn rites of Demeter and Persephone, celebrated by the women, at the THESMOPHORIA, from the 9th to the 13th of Pyanepsion (October). On the first day the women retired to a village near Athens, where on the second day secret rites, seemingly full of jests and mockery, were performed. On the third day they returned to the Thesmophorion, a temple of the goddesses in Athens, where on the fourth day they fasted and offered propitiatory or expiatory sacrifices, especially of pigs. The fifth day was given up to dances and games, which were apparently of very doubtful propriety, and the celebration ended with banquets given by the wealthier women and a solemn sacrifice. A play of Aristophanes (q.v.), the *Thesmophoriazusæ* (q.v.), deals with this festival.

Among the Spartans two festivals of Apollo occupy the chief place. First come the HYACINTHIA, celebrated at Amyclæ, the ancient capital of Laconia (see AMYCLÆ, 1), and connected with the accidental death of Hyacinthus (q.v.), the favorite of Amyclæan Apollo. It drew together the whole population of Sparta, and its observance was so strong a religious obligation on the men of Amyclæ that they even sought leave from their generals in order to return for it. It came in the spring and united mourning for the death of the boy with joy at his return. The first day was given up to sorrow, and an offering at the grave beneath the altar of Apollo; on the second day were choruses by boys, processions, and dances, in honor of Apollo, while the evening was spent in feasting. The doings of the third day are not reported, but very possibly at this time the venerable image of Apollo was presented with the new robe which the women of Sparta embroidered yearly. Even more important was the great festival of the CARNEIA, held during nine days of summer and so highly regarded by the Spartans that, when it approached, no military operations were undertaken. It was originally a herdsmen's festival, but at Sparta had assumed a military character. The men bivouacked in booths, in nine divisions, and all the exercises were governed by the commands of the herald. We hear also of musical contests, and a singular foot race in which one man was pursued by a number of others. If he was caught, it was a sign of good luck, while his escape foreboded evil. Parallel usages among other peoples seem to show that the runner is a personification of the fruits of autumn, so that his capture assured prosperity. Both these festivals were common to the whole Dorian race, but the details of their celebration at other places are unknown.

At Delphi, in the THEOPHANIA, or 'Manifestation of the Deity,' the return of Apollo in the spring after his winter sojourn among the Hyperboreans was celebrated, while in the THEOXENIA, or 'Entertainment of the Gods,' Apollo and the other gods were entertained at a sumptuous feast to which distinguished men, such as the poet Pindar, were sometimes invited as a mark of respect. (Cf. the Roman LECTISTERNIUM.) Other festivals of this kind were celebrated elsewhere in honor of other gods. Throughout Bœotia and also at Delphi it was common to honor Apollo with processions in which laurel branches were carried. At Thebes these DAPHNEPHORIA were celebrated only every ninth year, when the god was represented by his youthful priest, who was preceded in the procession by a relative carrying a long olive rod, wound with laurel and flowers, and with iron balls at each end and the middle, to which numerous ribbons were attached. The balls represented the sun, the moon, and the stars. The priest was followed by a chorus of maidens with suppliants' branches, who sang the praises of the god. Among the splendid festivals of Greece were the DELIA, celebrated every fifth year at the beginning of spring, by the assembled Ionians, at Delos. The celebration was an old one which had fallen into disuse, but was reinstituted by the Athenians in 426-425 B.C., after they had carefully purified the island by the removal of all graves. (See DELOS.) In the years of its occurrence it replaced the old annual festival of the Apollonia. To it the Athenians sent a state delegation on the ship which was said to have carried Theseus to Crete, and during its absence no death sentence could be executed—a law which prolonged the life of Socrates for nearly a month. The festival included athletic games, horse races, and competitions between choruses, and seems to have been the scene of famous musical contests. After the great victory of Platæa, Pausanias and the Greeks instituted the ELEUTHERIA in gratitude to Zeus, the Giver of Freedom (Zeus Eleutherios), and these were celebrated with annual sacrifices and athletic contests in every fifth year at least as late as the second century of our era. In connection with some festivals we hear of CALLISTEIA, contests of beauty, which were between women on Lesbos and Tenedos, in connection with the worship of Hera, and at Basilis in Arcadia, in connection with the worship of Demeter, while in Elis the contestants were men; and a similar rivalry between the old men of the tribes seems to have formed part of the Panathenæa.

The festivals of the gods are noted in Preller, *Griechische Mythologie* (4th ed. by C. Robert, Berlin, 1887-94; consult especially Index IV). They are also briefly described in Schömann-

Lipsius, *Griechische Alterthümer*, ii (Berlin, 1902), and Stengel "Griechische Kultusalterthümer," in Müller, *Handbuch der klassischen Altertumswissenschaft*, vol. v (Munich, 1898). For Athens, consult: A. Mommsen, *Die Feste der Stadt Athen im Alterthum* (Leipzig, 1898); Gulick, *The Life of the Ancient Greeks* (New York, 1902); Tucker, *Life in Ancient Athens* (ib., 1906). Consult also articles on the various festivals named above, in Smith, *A Dictionary of Greek and Roman Antiquities* (3d ed., 2 vols., London, 1890–91).

GREEK FIRE. The common name for a combustible and explosive compound employed by the Greeks of Constantinople throughout the Middle Ages. The original type of the composition is said to have been brought to Constantinople by Callicinus of Heliopolis in the seventh century and to have been invented by him. But incendiary compositions of somewhat similar character, consisting of sulphur, pitch, and charcoal, had been known and used for 1000 years before, while the use of liquid fire is shown on Assyrian bas-reliefs. Whatever its origin, Greek fire was exceedingly efficient as an incendiary material, being so nearly impossible to extinguish that it usually set fire to any vessel it was thrown upon. Its efficacy and the terror its use inspired contributed greatly to the naval strength of the Eastern Empire and enabled it to keep control of the sea for several centuries.

Its composition was probably not always the same and is variously given by different authorities. Æneas Tacitus mentions an incendiary composition of sulphur, pitch, charcoal, incense, and tow which was used in the fourth century B.C. It was packed in wooden vessels and thrown on the decks of the enemy's ships. In 350 A.D. Vegetius gives a similar recipe with naphtha or petroleum added.

If the story of Callicinus is correct, he either rediscovered these ancient formulas or added something to them. Colonel Hime suggests quicklime, but this is a doubtful ingredient to add to a naphtha or petroleum composition. In the *De Mirabilibus Mundi*, ascribed to Albertus Magnus, the manufacture of Greek fire is thus described: "Quick sulphur, dregs of wine, Persian gum, baked salt, pitch, petroleum, and oil all boiled together." It seems reasonably clear that the early forms of Greek fire contained no saltpetre. But as crude saltpetre was found on the surface in certain parts of Asia Minor, Persia, and India, it may later have been substituted for the salt in one of the many formulas—probably by accident—and its superiority to common salt recognized. If this is so, we have the essential ingredients of gunpowder. In the early days of its use by the Greeks of the Eastern Empire tow or flax was saturated with it and attached to arrows or javelins or packed in wooden cases. After being lighted it was projected or thrown on board the galleys of the enemy. In later times tubes were fixed in the bows of galleys and the burning mass discharged through them on the decks of opposing vessels at the moment of collision. Darts and stones were mixed with the other material.

The rear ends of these tubes were arranged to receive the charging piece or cup. This cup contained the Greek fire, which was ignited at the proper moment. It is significant that the earliest guns known had a charging cup (shaped not unlike a beer stein) to contain the powder. This fact and its composition lead to the belief that Greek fire in one of its many forms was the prototype of gunpowder. The popular idea that the latter was invented or discovered by Berthold Schwartz in the fourteenth century is now known to be incorrect, as Roger Bacon described it as an explosive in 1242. However, it was not until the beginning of the fourteenth century that gunpowder as a propellant in guns seems to have come into general use. Consult: Bury, *The Later Roman Empire*, vol. ii (New York, 1889); Oman, *The Art of War* (London, 1898); Bury's edition of Gibbon's *Decline and Fall*, vol. vi, appendix v (ib., 1912); Guttman, *Monumenta pulveris pyrii* (ib., 1906); *Thucydides*, ii, 77, and iv, 100; Hime, *Gunpowder and Ammunition: Their Origin and Progress* (London, 1904); Biringuccio, *De la pirotechnia* (Venice, 1540); Tartaglia, *Quesiti e invenzioni diversi*, lib. iii. (Venice, 1546); Beckmann, *History of Inventions* (4th ed., 2 vols., London, 1846).

GREEK GAMES. See GREEK FESTIVALS.

GREEK KALENDS (Lat. *Kalendæ Græcæ*). A phrase characterized by Suetonius (*Augustus*, 87) as a peculiar expression employed by Augustus in his letters: "when Augustus wished to indicate that certain men would never pay," declares Suetonius, "he said they would pay on the Greek Kalends," i.e., never, since there was nothing in the Greek Calendar corresponding to the Roman Kalends. (See KALENDS.) The expression, though now proverbial, occurs nowhere else in the Latin that has come down to us from ancient times.

GREEK LANGUAGE. The Greek language belongs to the Indo-European or Indo-Germanic family of languages (see INDO-GERMANIC LANGUAGES), and is closely related to the Italic dialects—Latin, Oscan, Umbrian, etc. Greek, however, has preserved a far greater number of forms from the so-called parent language than have any of the Italic languages. This variety of forms, and a great power to make new words, combined to render Greek the most flexible and beautiful language of the whole Indo-European family.

Alphabet and Pronunciation. The date of the beginning of writing in Greece is unknown, although recent discoveries have made it appear probable that some system of writing existed long before 1000 B.C. The earliest Greek inscriptions cannot be dated earlier than the seventh century B.C. The alphabet in which these inscriptions are written, and which is the parent of all modern European alphabets, was derived from that of the Phœnicians. (See ALPHABET.) The Phœnician alphabet consisted of 22 signs, which the Greeks adapted to their own phonetic system, adding to them four new signs, ϒ, Φ, X, Ψ. The value of the last two was not the same in all alphabets; the Eastern Greeks used X with the value of (hard) *ch*, Ψ with the value *ps*, while the Western Greeks gave to X the value of English *x*, and to Ψ the value of *ch*. (On these four signs, consult Earle, "The Supplementary Signs of the Greek Alphabet," in *The American Journal of Archæology*, 2d series, vol. vii, New York, 1903.) One of the Phœnician signs for *s* was very early dropped, and in the Eastern group of alphabets *F* (the digamma, equivalent to *v* or *w*) and Ϙ (koppa, equivalent to *q*) fell into disuse, in consequence of the gradual loss in the spoken language of the sounds (*w* and hard *k* respectively) which these symbols represented. Further than this, the

Ionians, as early as 550 B.C., began to use the symbol H to represent the sound of long *e* and invented a new letter Ω to represent the sound of long *o*. The Attic alphabet at first occupied a middle ground between the Eastern and the Western groups. It did not use *F* and rarely employed Ϙ. It had Υ, Φ, and X with the values given them in the Eastern alphabets, but not Ξ or Ψ, for which it used XΣ and ΦΣ. It retained H for the "rough breathing" (see next paragraph) and used E for both long and short *e*, as well as for the spurious diphthong EI (vide infra), and O for long and short *o*, and the spurious diphthong OΥ. This old Attic alphabet was used in official documents at Athens until the archonship of Euclides (403 B.C.), when the Ionic alphabet, which had long been in use in private life, was adopted for the public records and rapidly drove out the old local alphabets. (See ALPHABET.) The 24 signs of the Greek alphabet, as finally developed, with the corresponding English letters, are as follows:

Greek	English	Greek	English	Greek	English
Α α	a	Ι ι	i	Ρ ρ	r
Β β	b	Κ κ	k	Σ σ ς	s
Γ γ	g	Λ λ	l	Τ τ	t
Δ δ	d	Μ μ	m	Υ υ	u, y
Ε ϵ	ĕ	Ν ν	n	Φ ϕ	ph
Ζ ζ	z	Ξ ξ	x	Χ χ	ch
Η η	ē	Ο ο	ŏ	Ψ ψ	ps
Θ θ	th	Π π	p	Ω ω	ō

The "rough breathing" (ʽ) is placed over an initial vowel and over ρ to signify that the word begins with an aspirate (*h*); so, ἅρμα, pronounced *harma*. The "smooth breathing" (ʼ) means that the initial vowel is without the *h* sound. The signs for the breathings were developed out of ⊦ and ⊣, themselves halves of H, the sign once employed in the Attic alphabet to denote the rough breathing. (See preceding paragraph.)

Most of the consonants were pronounced in the fifth century B.C. like the corresponding English letters, except that γ was always hard (as in *go*) and before κ, γ, χ and ξ had the sound of *n* (as in *sing*); ζ was pronounced like *dz* in *adze;* θ was always pronounced like *th* in *thin;* and χ was hard, as in German *ach*. The vowels were thus pronounced: α like *a* in *father*, ϵ like *e* in *met*, η like *ė* in *prey*, ι like *i* in *machine*, ο like *o* in *obey*, υ like French *u*, German *ü*, ω like *o* in *tone*. The sounds of the diphthongs αι, ϵι, οι, αυ, and υι are those of the diphthongs in *aisle, eight, oil, our, we*, respectively; ου early became a simple sound as in *group;* ϵυ and ηυ were pronounced *ĕh-oo* and *ēh-oo*. In ᾳ, ῃ, and ῳ the ι subscript was at first distinctly pronounced, but later its sound was lost, and these diphthongs came to have the sound of simple α, η, and ω.

Accent. The Greek accent, unlike the English accent, was an accent of pitch, not of stress. Three sorts are distinguished—the acute (marked ʹ), or high tone, extending to the end of the vowel or diphthong upon which it falls; the circumflex (marked ⌢), or high tone followed by a lowering of pitch, used only on long vowels and diphthongs; and the grave (marked ˋ), indicating a lowering of pitch. The grave accent is used only as a substitute for the acute on a word or on the last syllable of a word when it precedes another word. The circumflex may stand upon either of the last two syllables, but on the penult only when the last syllable is short. The acute stands on any of the last three syllables, but on the antepenult only when the last syllable is short. With these limitations, the accent of most words is recessive, but never stands further from the end than the antepenult. A number of short words, called proclitics and enclitics, have no accent, but lean, so to say, upon the words which they immediately precede or follow.

Dialects. Long before the dawn of history Greek comprised a number of dialects, which maintained their individual peculiarities until comparatively late times, although these differences were never so great as to prevent easy communication between the inhabitants of different districts. The study of the Greek dialects has been greatly advanced in recent years by the discovery and publication of inscriptions. In general, the dialects fall into the two groups of Ionic and non-Ionic, distinguished by a tendency on the part of the Ionic dialects to change original *ā* to *ē*. Further than this we can distinguish, inside the non-Ionic group, two families of dialects, the Æolic and the Doric, although recent investigation has shown that this twofold division cannot be carried out as strictly as was formerly supposed. (See ÆOLIANS; DORIANS; IONIA. These articles will indicate also the areas over which Greek, in its various dialects, was spoken. For the use of the language in literature, see GREEK LITERATURE.) The principal characteristics of the Ionic, Doric, and Æolic dialects are as follows:

Ionic.—The Ionic dialect is characterized by (1) a wholesale change of original *ā* to *ē*; (2) the early loss of *F* (as early as 800 B.C.); (3) the use of ἄν = κα, κϵ. Two forms must be distinguished:

(1) The Ionic of the Asiatic coast and many of the Ægean islands, frequently named simply Ionic. This displays a marked aversion to contraction and admits successive vowel sounds. It includes:

(*a*) Old Ionic, the language of the Homeric poems, and of epic poetry in general, a dialect partially artificial and probably never spoken at any one time.

(*b*) New Ionic, the spoken language of the Ionian cities, with many local variations, but showing a preference for κ instead of π in pronominal roots (κοῖος, κόσος = Att. ποῖος, πόσος), frequent preference for ω instead of αυ or ου (θῶμα, ὦν = Att. θαῦμα, οὖν), and dislike of aspirates (ἐπορᾶν, δέκομαι = Att. ἐφορᾶν, δέχομαι). This is the language of the early logographers (q.v.), of Herodotus and Hippocrates.

(2) *Attic.*—Attic is closely related to Ionic, but differs from it in the retention of α in certain positions, i.e., after ρ, ϵ, and ι (πράττω, μανία = Ion. πρήσσω, μανίη), and in a marked tendency to contraction of vowels. This is the principal literary dialect, used in the works of Thucydides, Xenophon, Plato, the dramatists and the orators. It is commonly taken by grammarians as the norm, and the other dialects are regarded as variants, although there is no historical justification for such a proceeding.

Doric.—Doric was spoken on the Isthmus of Corinth, in the greater part of the Peloponnesus, Corcyra, Magna Græcia, Sicily, Cyrene, Crete, Byzantium, Rhodes, the southwestern corner of Asia Minor, Melos, and some of the other islands of the Ægean. It is, in the main, the language of Pindar and Theocritus. It is characterized by (1) retention of α where the Attic prefers η (μάτηρ = Att. μήτηρ); (2) formation of the gen. pl. in ᾶν, gen. sing. masc. in α (πολιτᾶν, πολίτα = Att. πολιτῶν, πολίτου); (3) μες, for μεν, in first pers. pl. of the verb (cf. Lat. *-mus*), ντι in third pers. pl. of the verb (ἥκομες, ἔχοντι = Att. ἥκομεν, ἔχουσι); (4) formation of the future in σέω, σῶ; (5) contraction of αε to η. A special group of dialects (sometimes called Northern Doric) is to be recognized in the inscriptions of Phocis, Locris, and the neighboring districts.

Æolic.—The dialect of Æolis (Northern Asia Minor). With this are commonly grouped the dialects of Bœotia and Thessaly, although they differ from it in many particulars. The poems of Alcæus and Sappho were written in Æolic (Lesbian), as were also three idyls of Theocritus. The dialect is characterized by (1) an objection to oxytones, i.e., to words with acute accent on the last syllable (κάλος, σόφος, αὖτος = Att. καλός, σοφός, αὐτός); (2) frequent objection to an initial rough breathing (ἔτερος, ὔμμες = Att. ἕτερος, ὑμεῖς); (3) instability of vowel sounds, combined with a fondness for ι and υ sounds (πίσυρες, ὄνυμα = Att. τέτταρες, ὄνομα); (4) preference for οι instead of ου where both arose from original ον (λίποισα, τοῖς = Att. λιποῦσα, τούς). The closely related group of Arcadian and Cyprian was formerly classified as Æolic, but is now placed in a separate category by conservative scholars.

Relation to the Primitive (Indo-European) Language. The Greek vowels usually represent similar sounds in the parent language. In many cases, however, they are of secondary origin, notably the characteristic Ionic and Attic η, which not only represents orig. *ē* (μήν = Lat. *mensis*), but also orig. *ā* (Att. φηγός = Dor. φᾱγός, Lat. *fagus*). Short α before or after λ, μ, ν, or ρ is often derived from an original sonant liquid or nasal (πατράσι = Skt. *pitṛ-šu*). The diphthongs αι, ει, οι, αυ, ευ, and ου often represent corresponding diphthongs in the parent language (οἴνη, Lat. *oinus, ūnus; αὐξάνω* = Lat. *augeo*); often, however, they are the result of a chance concurrence of two vowels, frequently due to the loss of an intervening consonant (εἶ, from ἐ[σ]ι). At the end of words ᾳ, ῃ, and ῳ represent original long diphthongs (χώρᾳ, ἵππῳ); elsewhere they are of secondary origin (ῥᾴδιος, from ῥᾳΐδιος, σῴζω, from σωΐζω). Apparently ηυ and υι were not original, but new formations during the independent existence of Greek. Often ει and ου are not true diphthongs at all (see below). Of the consonants, β, γ, δ, π, κ, τ, and σ usually represent the same sounds in the parent language. φ, χ, θ usually represent orig. *bh, gh*, and *dh* (φέρει, χειμών, τίθημι = Skt. *bhárati, himá, dadhāmi*). The liquids λ and ρ correspond, as a rule, to I. E. *l* and *r* (ἀρόω, κλύω = Lat. *aro, cluo*); μ and ν are commonly equivalent to I. E. *m* and *n*, although at the end of words ν frequently represents orig. *m* (ζυγόν = Skt. *yugám*, Lat. *jugum*). Initial ζ = j (cf. ζυγόν), but ζ usually represents a combination of δ or γ with ι; ξ and ψ are simply conventional symbols for a palatal (κ, γ, χ) or a labial (π, β, φ) mute with σ. Ϝ, when it appears, represents I. E. *v*, Eng. *w* (Ϝοῖκος = Skt. *vēśá*, Lat. *vīcus*). The rough breathing never corresponds to I. E. *h*, but often marks the loss of one or more consonants (ἅλς = Lat. *sal*, Eng. *salt;* ἡδύς, orig. σϜαδυς = Lat. *suadvis, suavis*, Eng. *sweet*). See PHILOLOGY.

Phonetic Changes. Many changes in the form of Greek words are to be traced to phonetic causes. The most important of the changes are: 1. *Loss of consonants.* Ϝ, although retained in some dialects until comparatively late times, shows a constant tendency to disappear (οἶνος, orig. * Ϝοινος, cf. Lat. *vinum;* εἶδον, orig. *ἐϜιδον, Lat. *vidi*); single σ disappears at the beginning of words and between vowels (ἑπτά = Lat. *septem*, γένους, from *γενεσος, through *γενεος, = Lat. *generis*); even σϜ has disappeared in some cases (ἱδρώς = Lat. *sudor*, Eng. *sweat*). At the end of words, consonants are often lost, owing to the law that only ν, ρ, and σ can terminate a word (nom. ἄρχων, from stem ἀρχοντ-); τ, δ, and θ regularly disappear before σ (ἐλπίς, for *ἐλπιδ-s); so, too, ν (δαίμοσι, for *δαιμον-σι), and the combinations ντ, νδ, νθ (γίγας, for γιγαντ-s). 2. *Change of consonants.* The combination of a consonant and ι (representing an original semiconsonant *i*) is the cause of many changes: δι becomes ζ (φράζω for *φραδιω); κι and χι become σσ, Att. ττ (φυλάσσω, Att. φυλάττω, for *φυλακιω); γι becomes sometimes σσ (τάσσω for *ταγιω), sometimes ζ (κράζω for *κραγιω); λι becomes λλ (ἄλλος for *ἀλιος = Lat. *alius*); νι and ρι become νν and ρρ, with subsequent loss of one consonant and lengthening of the preceding vowel (Lesbian κτέννω, φθέρρω, Att. κτείνω, φθείρω, for *κτενιω, *φθεριω), or else the ι is lost, and the preceding vowel is strengthened by the addition of an ι (the so-called epenthesis, i.e. φαίνω, for *φανιω). The vowel ι sometimes changes a preceding τ to σ (φέρουσι, Dor. φέροντι = Lat. *ferunt*). Before μ,—π, β, and φ become μ (λέλειμμαι for *λελειπ-μαι); κ and χ become γ (πέπλεγμαι for *πεπλεκ-μαι); τ, δ, and θ become σ (πέπεισμαι for *πεπειθ-μαι). The combinations μρ and μλ are strengthened and made easier of pronunciation by the insertion of β (μέμβλωκα for *μεμλωκα); and νρ is similarly strengthened and eased in pronunciation by the insertion of δ (ἀνδρός for *ἀνρος); at the beginning of a word, the μ or ν in such a combination is dropped (βροτός for *μβροτος, cf. Lat. *morior*). 3. *Loss of vowels.* ι sometimes becomes consonant (*j*) and is then lost (Ἀθηνάα for Ἀθηναία). So, too, υ between two vowels becomes Ϝ and disappears (βοός for *βοϜος, from stem βου-, Lat. *bovis*). 4. *Contraction of successive vowels* is frequent and in Attic regularly takes place (τιμῶ for τιμάω). The contraction of εε, εο, οο, οε, produces the so-called spurious diphthongs ει and ου, which were, in early times at least, spoken and written as simple sounds. 5. *Compensative lengthening of vowels.* When one or more consonants are dropped for euphony (especially before σ), a preceding vowel is often lengthened (μέλᾱς for *μελαν-s). The diphthongs ει and ου which arise from this process are also spurious, being simply lengthened forms of ε and ο (λύουσι for *λυοντσι). 6. *An exchange of quantity* sometimes takes place between a long vowel and a succeeding short one (epic νᾱός, βασιλῆος, Att. νεώς, βασιλέως).

Inflection. *Nouns.*—Of the eight original Indo-European cases, the Greek has preserved five: nominative, genitive, dative, accusative, and vocative. The locative, instrumental, and ablative cases are preserved only in a few adverbial forms, their functions being performed by the genitive and the dative. There are three declensions of nouns, according as the stem ends in α (first declension), in ο (second declension), or in a consonant, a diphthong, or a close vowel (third declension). For the α and ο stems the oldest endings are—sing. nom. ς (but feminines in α have no ending), gen. (σ) ιο, dat. αι, acc. ν; pl. nom. ι, gen. ων, dat. ισι, acc. νς. For consonant and close vowel stems, the endings are—sing. nom. ς, gen. ος, dat. ι, acc. ν or α; pl. nom. ες, gen. ων, dat. σι, σσι, or εσσι, acc. νς or ας. Vocatives proper have no ending. The dual, which is preserved in Greek (although it shows from very early times a constant tendency to fall into disuse), has the endings α and αιν for the first declension, ω and οιν for the second, ε and οιν for the third. The origin of these forms is uncertain. Neuters from ο stems form the nom., acc., and voc. sing. by adding ν; in stems of the third declension these cases are without ending. The nom., acc., and voc. pl. of neuters end in α. Many of the phonetic changes noted above are the result of the combination of stems with endings. *Pronouns.*—The pronouns that distinguish gender (demonstrative, relative, and interrogative pronouns) are inflected like nouns, with some slight variations. The inflection of the personal pronouns which do not distinguish gender differs from that of nouns in many ways, which cannot be discussed here. The stems of the personal pronouns are—singular, first person ἐμε (cf. Lat. *me*), second person σε (Lat. *te*), third person ἑ (Lat. *se*); dual, first person νω (Lat. *nos*), second person σφω, third person wanting; plural, first person ἡμε, second person ὑμε, third person σφε. The nominative singular forms, ἐγώ, σύ, of the first and second persons are from separate stems (cf. Lat. *ego, tu*). The definite article ὁ, ἡ, τό, corresponds to the Sanskrit *sas, sā, tat.* *Verbs.*—The Greek verb is one of the most highly developed parts of the language. Not only has the Greek preserved more completely than any other of the Indo-European languages the verb system of the parent language (its only rivals in this respect being the Indo-Iranian and the Slavic groups), but it has added to that system a number of forms of its own. Besides the active and the passive voices, the Greek finite verb has a third voice, the middle, which represents the subject as acting on or for itself. The verb has seven tenses, present, imperfect, future, aorist, perfect, pluperfect, and future perfect. It is thus enabled to express by distinct forms momentary, continued, and completed past action (by the aorist, imperfect, and pluperfect tenses respectively). It has forms for the dual as well as for the singular and the plural. Besides the indicative and imperative, the Greek verb has two oblique moods, the subjunctive and the optative, with separate forms for continued, momentary, and completed action. There is also a future optative, used, however, only to represent the future indicative in indirect discourse. Characteristic of past tenses is the augment (syllabic, which involves prefixing of ε to the verb stem, or temporal, which involves lengthening of the initial vowel). The perfect and the pluperfect are distinguished by reduplication—primarily a repetition of the initial syllable, though for the most part stereotyped in the form of a syllable consisting of the initial consonant of the root and the vowel ε. The present and imperfect are often formed by a strengthening of the verb stem. All tenses, except the future and the so-called first aorist, exist in two forms, called respectively thematic and nonthematic (or ω conjugation and μι conjugation), according as the tense stem and the personal endings are or are not connected by a "thematic vowel." There are two sets of personal endings for both active and middle. These vary somewhat in different dialects and in the active singular have often been affected by analogy, but in general the distinction in use is observed with considerable strictness, as follows: For pres., perf., fut., and subj.,—active sing. μι, σι, τι, dual τον, pl. μεν, τε, ντι; middle sing. μαι, σαι, ται, dual σθον, pl. μεθα, σθε, νται. For imperf., aor., plup., and opt.,—active, sing. ν, ς, τ, dual τον, την, pl. μεν, τε ν; middle, sing. μην, σο, το, dual σθον, σθην, pl. μεθα, σθε, ντο. Except in the aorist and the future, the passive forms coincide with those of the middle. The addition of these endings to the verb stem, whether with or without intervention of the thematic vowel, often causes phonetic changes under one or another of the phonetic laws stated above.

Word Formation. The Greek possesses a great variety of terminations by which nominal stems are formed from roots, although it is often impossible to assign a single meaning to each of these suffixes. The most important are ο, α, ι, υ, κο, λο, μο, νο, ρο, Ϝο, ιο (and corresponding forms ending in α), ας, ες, εν, ον, τηρ, τορ, and various combinations of these forms. Besides such primary formations, secondary forms, i.e., nouns (and adjectives) derived from other nouns, are common. The commonest suffixes of such denominative nouns are ευ, τα, τητ, συνα, ια, ιο, ισκο; of denominative adjectives, εο, ιο, ικο, ινο, εντ. The comparative suffixes are ιο and τερο, the superlative ισο and τατο. Denominative verbs are freely formed; the commonest endings of such verbs are αω, εω, οω, ευω, αζω, ιζω, αινω, υνω. In compound words two or more stems are combined, only the last being inflected. Except in compounds made for comic effect, the combination of more than two roots is unusual.

Later History. The conquests of Alexander the Great (330 B.C.) and the consequent spread of the Greek language over a great part of Asia led to the gradual abandonment of the other dialects and the adoption of Attic as the language of the whole Greek world. Thus arose the "common" dialect or "Koine" (κοινὴ διάλεκτος), a modified Attic, tinged with the peculiarities of the peoples by whom it was spoken. This common dialect is sometimes called Hellenistic Greek, i.e., the Greek spoken by foreigners (Ἑλληνισταί), not by native Greeks (Ἕλληνες). The Greek of the Septuagint (q.v.) and of the New Testament furnishes a good example of this Hellenistic Greek. (Consult BIBLE, I, 2, *The Original Languages of the Bible;* HELLENIST.) It is also, in various forms, the language of Aristotle, Polybius, Pausanias, Plutarch, and Lucian. The pronunciation was changed even more than the form of the language. As early as the third century B.C. ει came to be sounded like ι; ζ was pronounced like Eng. *z*. In the early Christian centuries η also assumed the sound of ι; αι came to be pronounced like simple ε. The diphthong οι was sounded like υ, and later both were sounded like ι. The diphthongs ending in υ modified or lost their second vowel. β, γ, and δ were softened in sound. During all this time the literary language continued to follow Attic models, but by 800 A.D. the difference between the spoken and the written language had become so great that the literary language could no longer maintain itself and was gradually supplanted by the spoken language. With this date, therefore, the period of modern Greek may be said to begin.

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The Greek Language, Modern. The differences between ancient and modern Greek are by no means so great as has commonly been supposed, the modern language being a direct descendant of the "common" dialect (vide supra). The beginnings of most of the changes that have affected modern Greek can be traced back into the Hellenistic period. Some of these changes have been noted above. Others are as follows: The ancient marks of accent have been retained, but they no longer represent a difference of pitch; the accent is a stress accent, exactly like that of English (traces of this change can be seen as early as 400 A.D.). The rough breathing is still printed, but is no longer pronounced. Iotacism has extended its influence until no fewer than six different vowels and diphthongs have the sound of ancient *ι*, viz., *ι*, *η*, *υ*, *ει*, *οι*, and *υι*. The dual number has entirely disappeared, and the middle voice appears in only a few isolated forms. In the language of the common people the dative case is practically lost, its place being supplied by the genitive or by the accusative with a preposition. Great numbers of nouns have taken the diminutive ending *ιον*, which in the vernacular is reduced to *ι*, and the loss of a syllable at the beginning of words is not infrequent; so *τυρί*, cheese = *τυριόν*, *τυρός*; *ψάρι*, fish = *ὄψον*, through *ὀψάριον*; *μάτι*, *eye* = *ὄμμα*. In many nouns, moreover, the accusative is taken as a new nominative; so *ὁ πατέρας* = *πατήρ*.

But it is in the conjugation of the verb that the greatest changes have taken place. Here the optative has entirely disappeared and the infinitive survives only in a mutilated form. The ancient uses of both optative and infinitive are replaced by subjunctive uses; *ὑπῆγα διὰ νὰ τὸν ἴδω* = *ἦλθον ἵνα αὐτὸν ἴδοιμι*; *θέλω νὰ ἔλθω* = *θέλω ἐλθεῖν*. The future, the perfect, and the pluperfect are formed by the aid of auxiliaries; *θὰ* = (*θέλω ινα*) *λύω* or *θὰ λύσω* = *λύσω*; *ἔχω λύσει* = *λέλυκα*; *εἶχα λύσει* = *ἐλελύκη*. The pronouns have suffered many changes. The awkward *ὁποῖος* or even the adverb *ποῦ* is used in place of the relative.

The vocabulary also has suffered from the intrusion of loan words from other languages, notably from Italian and Turkish, although the infusion has not been so great as to give the language the appearance of a mixed language; cf. *σπίτι* (Latin *hospitium*), house; *βαπόρι* (Ital. *vapore*), steamer; *δερβένι* (Turkish *dervend*), pass. Since the establishment of the Greek kingdom (1830), there has been a stronger movement towards the purification of the modern language and a closer conformity to the ancient Greek idiom. This has resulted in a curious gap between the literary language and the common speech, not unlike that which existed in the later classical times. The new movement, however, has made steady progress, and it is not too much to say that the modern Greek newspaper would be easily intelligible to Plato and Demosthenes. See ROMAIC LITERATURE.

The best Modern Greek grammars are those of Mitsotakis, *Praktische Grammatik der neugriechischen Sprache* (Stuttgart, 1891), and Pernot, *Grammaire grecque moderne* (Paris, 1897). In English, Vincent and Dickson, *A Handbook to*

Modern Greek (London, 1893), is good for the literary language; and Gardner, *A Modern Greek Grammar* (London, 1892), for the spoken language. Hatzidakis, *Einleitung in die neugriechische Grammatik* (Leipzig, 1892), treats especially the relation of the modern language to Hellenistic and Byzantine Greek. Of the greatest value is Thumb, *Handbook of the Modern Greek Vernacular*, trans. by Angus (Edinburgh, 1912), finely summarized and reviewed by Buck, in *Classical Philology*, ix (Chicago, 1914). Consult also Jannaris, *An Historical Greek Grammar, chiefly of the Attic Dialect, as Written and Spoken from Classical Antiquity down to the Present Time* (New York, 1901).

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GREEK LITERATURE. The literature of ancient Greece is important, not only because it is the earliest literature in Europe and the one which has had a mastering influence on all the others, but also for the intrinsic value of its remains, which prove it one of the greatest of all literatures. The Greeks possessed no such models for their guidance as later peoples have had, so that their literature is, as no other literature has been, an original and natural development; in it were determined most of the literary types employed by European peoples. Fortunately the remains of this ancient literature are large enough to enable us to trace the history of its various forms with a considerable degree of accuracy.

We can distinguish six natural divisions: 1. The Age of Epic Poetry; 2. The Lyric Period; 3. The Attic Period; 4. The Alexandrian Age; 5. The Græco-Roman Period; 6. The Byzantine Period.

1. The Age of Epic Poetry. This extends to the sixth century B.C. At the threshold of Greek literature we find two imperishable products of Greek genius, the *Iliad* and the *Odyssey.* But the very perfection of these poems shows that, far from being early efforts of a people unskilled in poetic composition, they represent the culmination of a long development in the art; furthermore, the contents prove that at least two, and probably three, kinds of poetic composition had been practiced from an unknown period. The earliest artistic compositions were probably hieratic in character; i.e., they formed part of the service of the gods. The earliest singers were "servants of the Muses," the goddesses who dwelt with the other celestials on Olympus in Thessaly. With the migrations of the Hellenic tribes to the south, a new centre of the Muses' worship developed on Helicon (q.v.), between Bœotia and Attica. Tradition gave the names of certain mythical singers, among whom the most famous were Orpheus, Musæus, Eumolpus, and Thamyris. Closely connected with hymns in honor of the gods were the hymeneal song and dirge for the dead, both of which were known to Homer. There also developed, among the different stocks, sagas celebrating the exploits of hero princes who led their peoples in warlike undertakings; and the material for epic song was greatly enriched by the great struggles and movements at the end of the second millennium B.C., consequent on the migrations of Thessalian and Dorian peoples towards the south. It is clear from the two great epics preserved to us that a long period had preceded them in which shorter epics had been sung by minstrels at courts and in the market place. In these epics of the different tribes the deeds of the national heroes were celebrated—of Achilles among the Æolians, of the Atridæ among the Achæans; the Dorians found their favorite subject in the exploits of Hercules. The struggle of the Seven against Thebes (see THEBAN CYCLE; THEBES; SEVEN AGAINST THEBES), the voyage of the *Argo* (see ARGONAUTS), and the siege of Troy were other frequent themes. (See CYCLIC POETS.) To the Trojan cycle of legends, probably the youngest of all, belong the *Iliad* and the *Odyssey.* In the view of some scholars, the story of the siege of Troy has as its historical basis the struggles of the Æolian colonists in Asia Minor with the earlier Phrygian inhabitants. Another view is that back of the two poems lies a real struggle between Troy and the Greeks for the control of the Hellespont—a control necessary to the expansion of Greece in the direction of the Euxine Sea. (Consult Leaf, *Troy: A Study in Homeric Geography*, London, 1912.) In the *Iliad* the chief figure is Achilles (q.v.), the hero of the Æolians, native in southern Thessaly. With the story of his deeds were combined shorter epics treating the deeds of other heroes. The whole is an incident in the tenth year of the war; the action covers but 49 days. The *Odyssey* belongs to the cycle of myths dealing with the return of the heroes from Troy. Although the action is confined to 41 days, the composer, by his skillful device of having Odysseus tell the story of his wanderings at the court of Alcinoos, the friendly King of the Phæacians, has succeeded in giving us a complete account of the hero's adventures during the 10 years after the fall of Troy, as well as the narrative of his dramatic return to his home. The poem, too, deals with the return of some of the other chieftains.

In antiquity these immortal poems were ascribed to a blind bard, Homer; but among the learned of the Alexandrian age some claimed that the two epics were not by the same poet. In modern times the "Homeric Question" has been a burning one since the publication of the *Prolegomena ad Homerum* by Friedrich August Wolf (q.v.), in 1795. (For an account of the controversy, the work done on the poems at the orders of Pisistratus, and the details of the general subject, see HOMER.) Many scholars now incline to regard the poems as works of the same poetic school, and each in the main the creation of a single poet (some hold that the two poems are the work of one author or that at least they belong to a single epoch, and picture exactly the same stage of culture), who drew freely on current epics, many of which may well have come into existence long before his time. (Consult Shewan, "Recent Homeric Literature," in *Classical Philology*, vii, Chicago, 1912; in opposition see Prentice, review of Drerup, "Das fünfte Buch der Ilias," in *American Journal of Philology*, vol. xxxiv, pp. 331–340 (Baltimore, 1913).) That the poems have suffered from later interpolations is certain. The date of composition is the ninth or the eighth century B.C.; the place of origin was apparently western Asia Minor, on the borders of Æolis and Ionia.

These two great epics covered but a portion of the legends about the Trojan War. Other parts were treated by an Ionian school of epic poets which flourished from the eighth to the sixth century B.C. These bards—known in modern times as the *cyclic poets*—joined their poems to the *Iliad* and the *Odyssey* as introductions or continuations. Of their works we have only the scantiest fragments and some prose abstracts. Other cycles of myths than the Trojan were handled by later epic poets, but of their works we have little knowledge. See EPIC POETRY.

There has further been preserved to us a collection of 34 "Homeric hymns," in honor of various divinities. These are not hymns in the strict sense of the word, but rather preludes for rhapsodists before beginning their proper recitals. The name is misleading, as they have nothing to do with Homer, but are the product of a later time; the earliest, the hymn to the Delian Apollo, can hardly have been composed before the latter part of the eighth century B.C., and the latest is not earlier than 500 B.C.

There were also current under Homer's name some sportive writings composed in epic form. The most famous are the *Margites* (q.v.), of which we have a few lines, and the *Batrachomyomachia* (q.v.) (Battle of the Frogs and Mice), of which some 300 verses are preserved. The latter is one of the earliest examples of parody in Greek literature. Scholars disagree as to its date—some placing it as early as the Persian wars, others regarding it as a product of the Alexandrian age.

The other great poet of the first period is Hesiod (q.v.) of Ascra in Bœotia, near Mount Helicon, who flourished towards the end of the eighth century B.C. The Hesiodic poetry is distinguished from the imaginative Homeric epics primarily by its homely character; the chief poem, the *Works and Days*, deals with the daily life of the farmer and gives him directions for his work. It is the earliest didactic poem known to us. The authenticity of other works ascribed to Hesiod—the *Theogony* and the *Shield of Heracles*—has been questioned.

2. The Lyric Period. *Elegiac and Iambic Poetry.*—Important economic and social changes took place in Greece during the period from the eighth to the fifth century B.C. Increase of population and development of manufactures led to the planting of Greek colonies all along the shores of the Mediterranean and Black seas; and within most of the home cities the government passed successively from monarchy to oligarchy, then to tyranny and democracy. The old preëminence of the aristocracy was greatly diminished, and a powerful moneyed class developed. With these changes the importance of the individual increased, knowledge was enlarged, and, above all, reflective thought began to demand a larger poetic expression than had been given to it before. New poetic forms, the elegiac and iambic, were developed in Ionia. The elegiac couplet (see ELEGY) was a slight modification of the hexameter, and the older poetry composed in this measure was always accompanied by the music of the flute. While early elegy dealt with a great variety of themes, it was always the expression of the thoughts and feelings of the poet himself, and never so passionate as iambic verse. This latter was first employed for satire, its quick movement suiting it to the expression of pointed thought and of more passionate feeling than the elegiac measure. It was also used for fables. Consult: Jebb, *The Growth and Influence of Classical Greek Poetry* (New York, 1894); Farnell, *Greek Lyric Poetry* (London 1891); Smyth, *Greek Melic Poets* (ib., 1900).

The ancients disputed as to whether Archilochus, Callinus, or Mimnermus was the inventor of the elegy; but Callinus of Ephesus, who flourished in the first half of the seventh century B.C., is usually reckoned the earliest of the elegiac poets. He employed the measure to encourage the Ionians in resistance against the barbarian invaders of their land. Tyrtæus, about a generation later, was probably an Ionian immigrant to Sparta, who by his verses inspired the Lacedæmonians to fight against the Messenians. Mimnermus of Colophon, who flourished towards the end of the seventh century, introduced new elements—love and sentimentality—into elegy, and therefore became a favorite with the Alexandrians and Romans. Solon (c.639–c.559 B.C.), the great lawgiver of Attica, used the measure after the manner of Callinus and Tyrtæus to incite the Athenians against the Megarians and later to celebrate the reforms he had carried through. In the hands of Theognis of Megara (c.540 B.C.), of whose works some 1400 verses are extant, elegy became the medium of moral (gnomic) precepts (see GNOME); it was employed for the same purpose also by his contemporaries Phocylides of Miletus and Demodocus of Leros. At the end of this century Xenophanes of Colophon employed elegy to express his philosophic thought. From the time of Simonides of Ceos (480 B.C.), famed chiefly as a lyric poet, elegy became the regular form for epitaphs. See EPIGRAM; EPITAPH.

Iambic verse was first brought to perfection by Archilochus of Paros (c.650 B.C.), who employed it with masterly power as a vehicle of personal satire. He was followed by Simonides of Amorgos, whose satire was general rather than personal. Hipponax of Ephesus (c.540 B.C.) was called the inventor of parody. By substituting a trochee for an iamb at the end of the verse, he modified the iambic line into the choliambic measure, in which he gave out the venom of his hate.

Lyric—or, as the Greeks called it, melic—poetry was inseparably connected with music. The metres employed show great variety; and many forms of lyric poetry developed, differing according to the purpose of the poem and the method of its rendition, whether by an individual or by a choral band. Tradition said that Terpander (c.675 B.C.) made a great development in music, possibly by adding three strings to the four previously employed on the lyre; he also developed new measures. The greatest of the early lyric poets were the Æolians, Alcæus and Sappho of Mitylene (c.600 B.C.). The former's lyrics covered a wide range of subjects, from political themes to the praise of love and wine. Sappho, the single great poetess of Greece, made her verse express her own fierce passions. Anacreon of Teos (c.530 B.C.) wrote in the Ionian dialect in praise of pleasure and sensuous delights. There were also many poets of choral lyric among the Dorians; the most important were Alcman (c.630 B.C.), who introduced lyric forms into Sparta and, according to tradition, developed the strophic structure of choral songs. Arion (c.600 B.C.) gave the dithyramb a finished form, and Stesichorus of Himera (c.640–555 B.C.) cultivated lyric poetry in Sicily and contributed to the development of the form of the choral ode. He went beyond the usual province of lyric poetry in that he ventured to handle epic themes. Ibycus of Rhegium (c.540 B.C.) followed Stesichorus closely. Simonides of Ceos (B.C. 556–468) was of great importance for the history of lyric poetry, for, combining the strength of Ionian genius with Dorian art, he addressed his lyrics to all Greeks and so gave this branch of poetry a universal character. His nephew, Bacchylides, who flourished in the first half of the fifth century B.C., like his uncle at one time a resident at the court of King Hiero of Syracuse, was famed for his hymns and odes, recently made known in part to us by an Egyptian papyrus. But the greatest of all the lyricists was Pindar (522–422 B.C.), a native of Thebes, yet in spirit and genius a national poet, whose extant hymns of victory attest his greatness. Pindar covered almost every province of lyric poetry and marks the culmination of this art in Greece. See LYRIC POETRY.

3. **The Attic Period.** The prestige which Athens gained in the Persian wars, and the power and wealth which her sea empire brought, soon made her the most prominent state in Greece. At the same time she became the centre of Greek intellectual life and maintained this position until the close of the fourth century.

The first great literary development of the fifth century was the drama. Tragedy and comedy alike had their origin in the worship of the god Dionysus (see GREEK FESTIVALS, *Dionysia*)—the former, as Aristotle says (consult his *Poetics*), developing from the dithyramb, the latter from the license of the phallic song. Tradition made Icaria, an ancient centre of the worship of Dionysus in Attica, the birthplace of Attic drama and named Thespis (q.v.) as the inventor of tragedy. The date given for the first tragic production is 534 B.C. From the end of the sixth century the state undertook the expense of the tragic choruses. Of the other tragic poets of the earliest period, Phrynichus (sixth to fifth century) most deserves mention. While the drama had as yet but a single actor, so that action in the proper sense of the word was impossible, still the extant titles show that Phrynichus handled a variety of themes. In the *Capture of Miletus* he introduced the handling of contemporary themes; in this he was followed by Æschylus (q.v.) in his *Persians*.

It was Æschylus (c.525–456 B.C.), however, who, by the introduction of a second actor, developed tragedy from a succession of narrative scenes to a play of action. The dialogue now became of more importance than the choral songs, whereas the opposite had been the case in the earlier period. Æschylus was nobly born and was deeply stirred by the dangers which threatened the Greeks from the Orient. He was a poet of the highest order and a most profound thinker, while his moral and religious feeling was genuine and intense. Many of his conceptions have a grandeur almost unparalleled in literature. Of the 90 plays which he is said to have written, but seven have been preserved; among them, however, is the single extant trilogy, the *Orestea: Agamemnon, Choëphori,* and *Eumenides.* The *Agamemnon* is regarded by many as the greatest Greek tragedy extant.

Sophocles (c.496–406 B.C.) was the greatest artist among the tragedians of the fifth century B.C. His conceptions lack the grandeur of those of Æschylus, and he is less humanly pathetic than Euripides, but he excels both in representing the great human emotions. His characters are always lofty and noble. He is, further, the interpreter of the highest ideals of the age of Pericles, and he must always be interpreted as such. By introducing a third actor he gave tragedy its final form. Of more than 120 plays which were attributed to him, we have but seven. Of these, the *Œdipus Tyrannus* is the greatest; in the opinion of many critics it rivals the *Agamemnon* of Æschylus for the first place among ancient tragedies.

Euripides (480–406 B.C.), in contrast to his older contemporary, Sophocles, represents Athens in transition from the age of Pericles to the new conditions of the fourth century; with him the decline of tragedy is usually said to begin. Although it is true that he is the last of the great tragedians, we can more correctly hold that he represents the last stage in the development of ancient tragedy and marks the way to the later drama. Tragedy in his hands lost much of its ideal character and came down to earth: his heroes talk and act as ordinary men talk and act; his language, too, approached that of everyday life. While he was bitterly attacked by the comic poet Aristophanes, the mouthpiece of the ultraconservatives, he still enjoyed even during his lifetime the high reputation he deserved. He exercised a profound influence on all later Greek drama, tragic and comic both, and more perhaps than any other single Greek author influenced Roman writers. (See, e.g., ENNIUS.) In tender pathos he was unexcelled, as well as in the representation of love and hate, and many scenes in his dramas are unequaled. Yet in the management of his plots he was inferior to his predecessors. Euripides left 92 plays, of which we have 18, including the *Cyclops,* the unique extant example of a Satyr play. The *Rhesus,* which is found with these plays in the manuscripts, is generally regarded as spurious. Among the best of his plays are the *Medea, Hippolytus, Bacchæ,* and *Iphigenia at Aulis.*

As has been said above, comedy also developed in connection with the worship of Dionysus. Tradition said that Megara was its first home, and that Susarion (c.580 B.C.) transplanted it to Attica. It came to perfection on Athenian soil more slowly than its sister art tragedy; the state did not undertake the expense of it until about 470 B.C. In the meantime Epicharmus (c.480 B.C.) brought a form of comedy to high development in Sicily and undoubtedly influenced Athenian writers.

Attic comedy is divided into three periods—Old Comedy (sixth century–400 B.C.); Middle Comedy (400–336 B.C.); New Comedy (336–250 B.C.). The comic poets at Athens in the early fifth century—Chionides, Ecphantides, and Magnes—are little more than names to us. The great poets of the Old Comedy were Cratinus (died c.421 B.C.), Eupolis (died c.411 B.C.), and Aristophanes (c.450–385 B.C.). Only fragments of the comedies of the first two are extant; of the plays of Aristophanes, the greatest of the three, we have 11 complete, covering the period 425–388 B.C. These exhibit the great genius of their writer, his keen wit and stinging satire, as well as his mastery of broad burlesque, and also show him to have been a lyric poet of marvelous sweetness (cf., e.g., the choral passages in the *Birds*). Further, his plays mirror the changing social and political conditions of the time in which they were produced. In the earlier plays the prevailing theme is the sharpest personal and political satire; in the middle group there is much greater reserve; and in the last plays personal and political attack is abandoned for literary and social satire. This tendency, with the gradual decay of the chorus, marks the transition to the Middle Comedy. In this the choral element was insignificant, and the themes were frequently philosophical and literary criticism, parodies of myth—one of the stock subjects from the earliest period also—and social satire. The chief names in this period are Antiphanes, Anaxandrides, and Alexis. The New Comedy was distinctly a comedy of manners, with stock characters and situations. The most important poets were Philemon (361–263 B.C.), Diphilus, and above all Menander (342–291 B.C.). The strength of this comedy was in the fine delineation of character, smoothness of verse, and fineness of wit. Of it, as of the Middle Comedy, no play has been preserved complete (see, however, MENANDER); but the adaptations of Plautus and Terence with the extant fragments enable us to reconstruct its general characteristics.

The Greek drama had reached its full development before a prose literature in the strict sense of the word appeared. The earliest literary prose was used in Ionia, the birthplace of artistic Greek poetry. In the middle of the sixth century B.C. Pherecydes of Syros set forth his philosophical doctrine in prose; Anaximenes and Anaximander also employed the same vehicle. Towards the close of the sixth century there also appeared in Ionia the beginnings of historical writing. The earliest historians were called *logographi* (see LOGOGRAPHERS), writers of prose, to distinguish them from *epopoii*, the writers of epic verse. They compiled genealogies, myths, and legends, and recorded the history of the founding of cities, the customs and institutions of various peoples, both foreign and Greek. Cadmus of Miletus was the earliest of the logographers; Hecatæus belonged to the period of the Persian wars. Others were Acusilaus, Xanthus, and Pherecydes of Leros. With Hellanicus of Mitylene (c.450 B.C.) more careful work began. He was a prolific writer, both on chronology and on the history of many states in Greece. But the title of "the father of history" belongs to Herodotus (c.484–c.424 B.C.). A native of Halicarnassus, born of a rich and noble family, he was a great traveler in Egypt, the remote East, and over most of the Greek world. He visited Athens twice, resided and probably died at Thurii, in southern Italy. His history was based on the material he collected in his travels and on the work of his predecessors. His purpose was to present a record of the dramatic struggle between Greece and Persia; as introduction to his main theme, he traced the rise and growth of the Persian Empire. In doing this he gave an account of the geography, history, and customs of Persia, Egypt, Libya, Babylonia, Thrace, and Scythia. The last four of his nine books relate the invasions of Greece by Darius and Xerxes. Herodotus was lacking in critical sense, did not go beneath the surface in seeking the causes of events, and had no interest in constitutional history. Yet his narrative of facts is usually correct. His real distinction is based on the fact that he was the first to compose a great historical work with unity of plan, and to bring large masses of facts into an ordered whole.

The founder of philosophical history was Thucydides (died c.399 B.C.). His history of the Peloponnesian War from its beginning to 411 B.C.—he did not live to complete it—is an attempt to give an accurate and concise record of events; it also shows deep study of causes and a careful investigation of facts. The account is dispassionate and impartial; certain passages are unsurpassed in their nobility and stern pathos. While we may regret Thucydides' neglect of social conditions, his work is one of the greatest histories ever written. Xenophon (c.434–c.355 B.C.) continued Thucydides' work in his *Hellenica* to the battle of Mantinea. Xenophon was the author of many other works, of which the most important are his *Anabasis*, an account of the expedition of Cyrus the Younger and of the successful retreat of the 10,000 Greeks from the heart of the Persian Empire; the *Cyropædia*, an historical romance with Cyrus the Great as its hero; and the *Memorabilia*, a report of the teachings of Socrates. In his minor works Xenophon appears as the first Greek essayist.

Among the later historical writers, none of whose works is preserved, must be named Ctesias, the real founder of Oriental history in Greek; Theopompus (born c.378 B.C.), and Ephorus (flourished c.350 B.C.), who introduced the rhetorical method of historical composition. From about 360 B.C. several writers known as the Atthids devoted themselves to Athenian history and archæology.

Athenian oratory received a powerful impulse from the teachings of the Sophists (q.v.), of whom Protagoras and Prodicus were the chief, and was also greatly influenced by Sicilian rhetoric, which Gorgias of Leontini introduced in 427 B.C. In the canon of the 10 Attic orators, Antiphon (c.480–411) holds the earliest place. His speeches retain the character of the older oratory and have much in common with the speeches Thucydides has placed in his history. The next three are Andocides (born c.440 B.C.), Lysias (c.450–380 B.C.), and Isocrates (c.436–338 B.C.). Of these, Lysias shows the perfection of the simple style, while that of Isocrates is more ornate and rhetorical. The latter's prose became the literary standard from the middle of the fourth century. Isæus (c.420–350 B.C.), the pupil of Isocrates, won his chief fame in cases of inheritance. All the preceding, however, were surpassed by Demosthenes (383–322 B.C.), who, by his complete mastery of language and rhetoric, and still more by his originality, his political insight, and his ardent zeal for the freedom of his native state, is the greatest orator, not only of all Greece, but of all history. His heroic though fruitless struggle to save Greece from subjection by Macedon, which he saw impending, is a splendid example of what can be accomplished by the genius of one man. Æschines (389–314 B.C.), the great rival of Demosthenes, was second to him alone in eloquence, while Lycurgus, Hyperides, and Dinarchus were less famous contemporaries.

Although the early Ionian philosophers had in some cases reduced parts of their doctrines to writing in both prose and verse, and the Eleatics, Xenophanes and Parmenides, and also Empedocles, composed long philosophical poems, little is left of their works. The same is true of the famous work *On Nature* by Anaxagoras (born c.500 B.C.), who transferred philosophy from Ionia to Attica. Socrates left no writings. The literary history of Athenian philosophy, therefore, begins with Socrates' greatest pupil, Plato (c.427–347 B.C.), the founder of the Academic school, although others—e.g., Æschines, Euclid of Megara, Phædo, and Antisthenes—composed works which reflected the manner and teaching of their master. Plato was born of a noble and rich family, traveled widely, and was for 10 years the disciple of Socrates. He was endowed with a remarkable poetic imagination and attained a charming and flexible style which lies between prose and poetry. In all, 42 dialogues are extant under his name, of which 35 are probably genuine. The *Republic*, *Phædo*, and *Gorgias* are perhaps the greatest.

Plato's pupil, Aristotle (384–322 B.C.), the founder of the Peripatetic school, was the first to apply a rigidly scientific method to investigation. He sought to map out the provinces of human knowledge and to show the principles underlying each and the problems with which each was concerned. He was the founder, in a strict sense, of scientific rhetoric, logic, political science, and natural history. His genius has influenced human methods of thought from his day to the present time. Aristotle's successor, Theophrastus (c.372–287 B.C.), has left us two botanical works and a collection of 30 character sketches, as well as some fragments of philosophical and scientific works.

4. **The Alexandrian Age.** With the decay of local political life in Greece and the gradual withdrawal of thoughtful men from public affairs, there came an enlargement of intellectual sympathy and a cosmopolitan attitude of mind unknown to the Greeks of the earlier period. The conquests of Alexander, which enormously enlarged the sway of Greek ideas and bound the world together as never before, contributed greatly to the new spirit which is characteristic of the Hellenistic period. Alexandria became the centre of this new world; and in that city was developed a literature, no longer spontaneous or creative, but derivative and erudite. (See ALEXANDRIAN AGE.) Learned poetry was cultivated by Callimachus (c.310–c.240 B.C.), famous for his elegies, hymns, and epigrams, some of which we still have; Aratus (born c.270 B.C.), author of an extant astronomical epic; Lycophron (c.270 B.C.), whose obscure poem *Alexandra* has survived; Apollonius Rhodius (c.295–c.215 B.C.), whose artificial epic, *Argonautica*, is the best work of its kind that this period has left us; and finally Nicander (c.150 B.C.), who composed medical and other didactic works in epic form. The truest poet of the age was Theocritus (c.310–c.245), whose pastoral idyls are unsurpassed in any literature. Bion, a contemporary of Theocritus, and Moschus (c.140 B.C.) wrote also in the pastoral manner. Three of Theocritus' poems are mimes, dramatic pictures of common life, such as were first developed by Sophron in the fifth century. This class of literature was cultivated with great success by Herondas (c.250 B.C.). Closet tragedy, parody, and satire also flourished at this time.

Prose literature was scientific. The librarians Zenodotus, Aristophanes, and Aristarchus established literary scholarship and grammatical study on scientific bases; Euclid created a system of geometry; and Eratosthenes founded astronomical geography and scientific chronology. In the third century B.C. Manetho and Berosus wrote chronological histories of Egypt and Chaldæa respectively.

5. **The Græco-Roman Period** (146 B.C.–529 A.D.). After the conquest of Greece by Rome in 146 B.C., Rome gradually took over the intellectual as well as political life of Greece, although she did not become a great centre of the world until the Imperial age. Polybius (c.205–c.120 B.C.), the chief Greek historian after Herodotus and Thucydides, belongs to the transition period. His history, in 40 books, records the course of Roman conquest from 264 B.C. to the fall of Carthage (146 B.C.), more especially from 220 to 168 B.C. It has reached us in a mutilated form, but is the most important source of our knowledge of the period. About 40 B.C. Diodorus Siculus wrote a history of the world down to Cæsar's Gallic Wars, in 40 books, of which we have complete only books i–v and xi–xx. Dionysius of Halicarnassus, in Augustus' reign, composed an early history of Rome, designed as an introduction to Polybius; of this there are extant only the first 10 books, reaching to 450 B.C., and some fragments. His rhetorical writings exhibit considerable critical ability. Other historians are Josephus (born 37 A.D.), whose two works on the Jews are of great value; Plutarch (c.46–c.120 A.D.), author of the famous *Parallel Lives* and *Morals;* Arrian (95–175 A.D.); Appian (flourished 150 A.D.); Dio Cassius (c.150–c.235 A.D.); and Herodian (flourished 230 A.D.). The *Lives of the Philosophers*, by Diogenes Laërtius (third century A.D.), and Philostratus' *Lives of the Sophists*, are valuable historical sources. Geography is represented by Strabo (c.64 B.C.–19 A.D.). The work of Pausanias the Periegete (c.160 A.D.) is of the greatest value for a knowledge of Greek topography and works of art. In the same century Ptolemy developed his system of geography and astronomy, and Galen composed his medical treatises. At the close of this second century Athenæus wrote his *Deipnosophistæ*, a miscellany on every possible subject, cast in the form of a dialogue, which is valuable for the varied information it contains, drawn from sources now lost to us. Systematic rhetoric is represented by Hermogenes (second century) and Longinus (third century), and the new oratory of the later Sophists by Dio Chrysostom (first century), Ælius Aristides (second century), and by Themistius, Himerius, and Libanius (fourth century). The writings of the Greek fathers of the Church cannot be touched on here. (See PATRISTIC THEOLOGY.) Romance was cultivated by Xenophon, Longus, Heliodorus, Achilles Tatius, and Chariton. The most important literary philosophers were the Stoics, Epictetus and Marcus Aurelius; the Neoplatonists, Plotinus, Porphyry, Iamblichus, and Hypatia, and the Athenian Proclus. The poets of the period are Babrius, Oppian, Nonnus, and Quintus Smyrnæus. Finally must be mentioned Lucian of Samosata, the great satirist and stylist of the second century, who most resembles Aristophanes in his wit and humor.

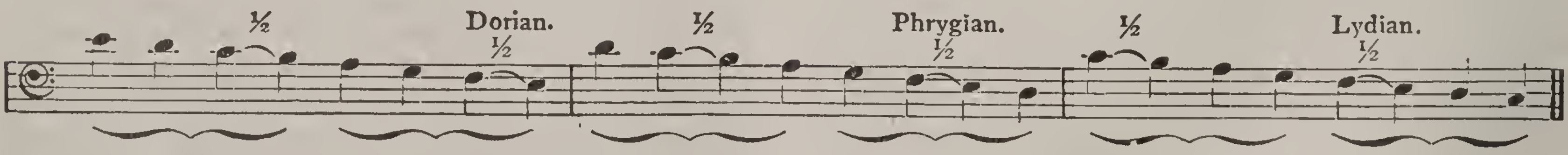
6. **The Byzantine Period, to the Fall of Constantinople** (1453). The latest of the writers mentioned in the preceding section might be counted in this period. For more than 1000 years after the removal of the capital from Rome, Constantinople was the metropolis of an empire whose language was Greek, and from which a vast literature has been preserved, much of which is of value. No adequate account can be given in the brief space here allowed; only the most important fields can be named. In history no genius appeared; but a long line of historians and chroniclers, from

Agathias, in the sixth century, to Georgius Phrantzes and Laonicus Chalcondyles, in the fifteenth, have preserved to us the record of the great Byzantine Empire. Rhetoric was best represented by Johannes Doxopater, Alexis Comnenus (Byzantine Emperor, eleventh century), Georgius of Cyprus, Nicephorus Chumnus, and Theodorus of Hyrtace (thirteenth century), and Demetrius Cydones (fourteenth century). Philosophy was not a favorite pursuit; but Michael Psellus (1018–c.1100) deserves mention for the enormous range of his intellectual activities. The most famous of theologians was Johannes Damascenus (eighth century), while in the polemical strife of the fourteenth century Nicephorus Gregoras, Gregorius Palamas, Johannes Cantacuzenus, and Cyparissiotes took the leading parts. Naturally the study of the ancient authors occupied the learned in this period, and many commentaries have come down to us; in most cases, unfortunately, these are hardly more than stupid dilutions and expansions of ancient commentaries still extant. The best known of the Byzantine scholiasts are: Tzetzes (twelfth century); Eustathius (twelfth century), famous for his great commentary on Homer; Moschopulus (thirteenth century), who wrote on Homer, Pindar, the tragedians, and Theocritus; Thomas Magister (thirteenth to fourteenth centuries), commentator on the tragedians and others; Johannes Pediasimus, whose scholia on Hesiod have a slight value; and Triclinius (fourteenth century), whose writings include commentaries on Hesiod, Pindar, and the tragedians. The lexical work of the time is represented chiefly by Photius, Suidas, and the several *Etymologica.* (See Etymologicum Magnum.) In poetry the great anthologies were collected, but little of original value was accomplished. (See Anthology.) Profane verse was cultivated by Theodorus Prodromus (twelfth century) and by Manuel Philes (thirteenth to fourteenth centuries), but the best poetic composition appears in Christian hymns. See Romaic Literature.

Bibliography. For the classical period, consult the histories of Greek literature in English, by Müller and Donaldson, Mahaffy, Jevons, Murray, Capps, and Fowler; in French, by Croiset; and in German, by Bergk, Bernhardy, Sittl, and Christ-Schmid (5th ed., Munich, 1908–13). For the Alexandrine age, consult: Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (2 vols., Leipzig, 1891–92); Couat, *La poésie alexandrine* (Paris, 1882); for the Byzantine period, Krumbacher, *Geschichte der byzantinischen Litteratur* (2d ed., Munich, 1897). Serviceable in various ways will be Symonds, *Studies of the Greek Poets* (3d ed., 2 vols., London, 1902); Jebb, *The Growth and Influence of Classical Greek Poetry* (Boston, 1894); Wright, *A Short History of Greek Literature* (New York, 1907); Jebb's "Sketch of Greek Literature," in Whibley's *A Companion to Greek Studies* (Cambridge, 1905); Wilamowitz-Moellendorf and others, *Die griechische und lateinische Literatur und Sprache* (3d ed., Leipzig, 1912); Baumgarten-Poland-Wagner, *Die hellenische Kultur* (ib., 1905) and *Die hellenistisch-römische Kultur* (ib., 1913); Bethe-Wendland-Norden, "Griechische und römische Literatur," in Norden, *Einleitung in die Altertumswissenschaft,* vol. i (2d ed., ib., 1913). More detailed works, less wide in scope, will be found cited in the articles on the various authors named above.

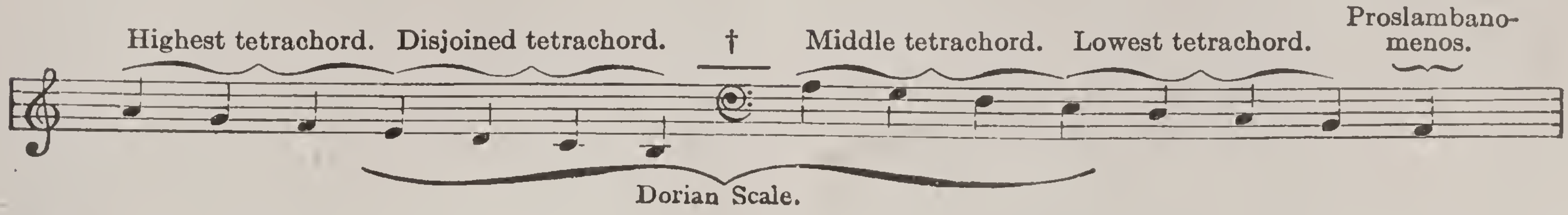
GREEK MUSIC. The development of music among the Greeks was never carried to that degree of perfection which characterized the other arts. Polyphony was unknown to them, and consequently their elaborate theoretical system had reference only to melody. How extensively their theories were carried out in practice we have little chance to judge, for our knowledge of Greek music is derived almost entirely from the writings of the theorists. The mathematical and technical details are very involved and are still the subject of discussion among scholars. The most noticeable general characteristics are, on the one hand, the limited compass, imperfect tonality, the thin, weak quality of their principal instrument (the lyre), and, on the other hand, perfect unison of musical form and language, a keen sense of difference in pitch, and splendid, delicate rhythms. But, as has been said, they had no conception of chords, and at its best their music must have been colorless.

Their system was the opposite of that used in modern music, for instead of taking the *major ascending* scale as a foundation, they used the *minor descending* scale, which was based, not on an octave and its repetition, but on a fourth and its repetition. Originally there were three scales —Dorian, Phrygian, and Lydian—named after the countries in which they sprang up. It would seem that at first these scales consisted of seven tones; but from the earliest times of which we have record they had eight tones, named from the strings of the lyre. The names of these tones were: nētē (lowest, this corresponded to our highest), paranētē (next to nētē), tritē (third), paramesē (next to mesē), mesē (middle), lichanos (forefinger string), parhypatē (next to the top), hypatē (topmost). The scale as thus formed was composed of two tetrachords, *disjointed* by a "diazeutic tone" (so called because it cut the scale in two). The three original scales were approximately as follows:



The diazeutic tone intervals were respectively b—a, a—g, g—f. To these scales were added the Hypo-Dorian, Hypo-Phrygian, and Hypo-Lydian, each a fifth *below* its original, and still later three more, the Hyper-Dorian, Hyper-Phrygian, and Hyper-Lydian, each of the latter being a fifth *above* its original scale. These additional scales were composed of *conjoined* tetrachords, the so-called "diazeutic tone" following the other notes in the case of the "hypo" scales and preceding them in the case of the "hyper" scales. The number of scales was ultimately increased to 15; but the above-mentioned nine were the important ones, and from them was developed the *Perfect System,* which became the basis of mediæval music. See Diazeutic Tone; Gamut; Plain Chant; Modes.

How the Perfect System became a standard we cannot tell; it probably grew slowly, as the compass of the various instruments increased. It comprised two octaves, a^1—A. The foundation was the Dorian scale, and to this were added two conjoined tetrachords, one at either end of the scale. This arrangement gave a compass of two octaves, lacking one note, and to complete the full octaves an extra note (called *Proslambanomenos,* the acquired tone) was suffixed. Baker gives the following arrangement of the Perfect System:



It will be seen that, as in the original Dorian scale, the two middle tetrachords were disjoined. For modulations to the key of the lower quint, "the semitone above the highest note of the middle tetrachord was used; and hence was formed a special conjunct tetrachord (d^1—c^1—b♭½–a), in apposition to the disjunct one." (Riemann.) The names of the tones in the Perfect System were derived from those of the original octave. The mesē was the tonic of this system, and was regarded as the central and most important note.

But though the Perfect System contained all the essential elements, there were certain defects to be remedied. Chief of these was the incompleteness of their chromatic degrees. As we have seen, their scales contained certain semitones; but to get a complete set of sharps and flats, they had recourse to *transposing scales.* The difference of their scales lay in the position of the semitone; so if, e.g., we substitute in the original Phrygian scale a conjoined tetrachord in place of a disjoined one, and by so doing change the position of the semitone, we shall have changed the scale to the Hypo-Dorian form. But although the position of the semitone is the same in both scales, the compass of this transposed Phrygian scale differs from the compass of the Hypo-Dorian. To all purposes, then, we have a new scale whose compass is Phrygian and whose form is Hypo-Dorian. This is called the transposed Phrygian scale. By this system of transposed scales the Greeks finally acquired a complete series of sharps and flats.

The musical *notation* of the Greeks was very complicated. They used a double set of characters, one for the singer and one for the player. At first there were 15 characters (corresponding to the notes of the diatonic scale), taken from the letters of the old Ionic alphabet. Other notes were made by changing slightly or inverting these original characters. The musical instruments were few and simple. The lyre (q.v.), the cithara (q.v.), and the magadis, or harp, with from 20 to 40 strings, were the most important stringed instruments; while the aulos, a flute, and the syrinx, a shepherd's pipe, were the sole wind instruments. Our examples of ancient Greek music are few. The oldest is a papyrus fragment of six lines of a chorus in the *Orestes* of Euripides. The fragment was written in the time of Augustus, but the music is much earlier. Two hymns to Apollo, composed in the second century B.C., were found at Delphi in 1893, engraved on the marble walls of the Treasury of the Athenians. These have been specially studied by Reinach, Weil, and Crusius. Another inscription from Asia Minor has preserved a short song with the musical notation. The other remnants are three hymns, two of which were composed in the time of Hadrian, and a few specimens of instrumental music. It is of passing interest to note that in 1899 a concert of ancient Greek music was given in Bremen. Consult: Gevaert, *La musique de l'antiquité* (Ghent, 1875), the standard work on ancient music; *La mélopée* (ib., 1895–96); Monro, *The Modes of Ancient Greek Music* (Oxford, 1894); E. Romagnoli, *La musica greca* (Rome, 1905); and for technical treatises, Johnson, *Musical Pitch and the Measurement of Intervals among the Ancient Greeks* (Baltimore, 1896), and Ambros, *Geschichte der Musik,* vol. i (Leipzig, 1888). For the remains of Greek music and the theoretical treatises, see K. von Jan, *Musici Scriptores* (ib., 1895–99); Reinach and Weil in the *Bulletin de Correspondance Hellénique,* xvii, xviii (Paris, 1894–95); O. Crusius, *Die delphischen Hymnen* (Göttingen, 1894). See also Gleditsch in Müller's *Handbuch der klassischen Altertumswissenschaft,* vol. ii (3d ed., Munich, 1901).

GREEK PHILOSOPHY. The philosophy of the Greeks, which is the source of the Western philosophy of modern times, as Homer is the source of Western poetry, had its origin, not in Greece itself, but in the colonies of Asia Minor and Magna Græcia. The earliest or pre-Socratic period may be broadly divided into the Ionic and Italic schools. Both attempted to determine the nature, origin, laws, and destiny of the visible world. The earliest definite name is that of the founder of the Ionic school, Thales of Miletus, who began the transition from the mythological to the scientific interpretation of nature, and the search for an original substance of reality which he found in water. He was followed by Anaximander, who found this substance not in water but in indeterminate matter, while a third teacher of Miletus, Anaximenes, preferred the definite substance of air. A little younger was the greatest of the pre-Socratic philosophers, Heraclitus. He held that the one substance, changing itself into all the elements known to us, was fire, which exhibits most clearly the constant movement and activity of the world.

Next comes Pythagoras of Samos, who settled at Crotona in Italy, about 530 B.C., and there founded what is known as the Italic school. In contrast to the Ionic school, which believed in one ever-changing, self-developed universe—what Ritter has called dynamical physicism—the Italic philosophical physicists found their key to the universe, not in any known substance, but in number and proportion. After the school of Pythagoras came a second Italian school, the Eleatic, traditionally regarded as founded by Xenophanes of Colophon, who migrated to Elea about 540 B.C. Its chief representative is Parmenides; his philosophy is the direct antithesis to that of Heraclitus in assuming that all that exists has existed and will exist the same forever, and that it is change and multiplicity alone which are illusory—an early idea of the indestructibility of matter.

The Ionico-Italic school represented mechanical physicism. Empedocles of Agrigentum and Anaxagoras, the teacher of Pericles and Euripides, agreed in accepting the Eleatic principle of the immutability of substance, while denying its absolute oneness. Democritus of Abdera was the chief exponent of the atomic theory, which based the universe on combinations of indivisible, unchangeable atoms. With him and Leucippus closes the series of the pre-Socratic dogmatists, who devoted themselves to the investigation of nature as a whole. Between them and Socrates, the great regenerator of philosophy, comes the skeptical and sophistic era. The earliest of the Sophists are Protagoras of Abdera and Gorgias of Leontini; Hippias of Elis and Prodicus of Ceos were somewhat younger. The effect of their teaching was the disintegration of established beliefs, although within the last few years there has been an attempt by some thinkers to give the Sophists, especially Protagoras, a much higher value as constructive thinkers.

Socrates, while sharing the general skepticism as to natural philosophy, maintained the certainty of moral distinctions and laid down a method for the discovery of error and the establishment of truth. Among those influenced by him were certain one-sided Socratics. Antisthenes, founder of the Cynic and indirectly of the Stoic school, was an exaggerator of the ascetic and unconventional side of Socrates. Aristippus of Cyrene, founder of the Cyrenaic school, also dwelt exclusively on the practical side of his master's teaching, holding that it was impossible to attain objective knowledge, but that pleasure is the true end of life. In Hegesias the Cyrenaic doctrine reached its fullest expression, anticipating much that later was regarded as Epicurean.

The two most famous disciples of Socrates were Plato and Aristotle. While in some ways they looked at life and being from distinct points of view, giving the foundation for the famous saying that "every man is born either a Platonist or an Aristotelian," they have manifold relations. Plato's rich contributions to logic, psychology, metaphysics, ethics, and natural religion required codification. Aristotle, with perhaps the greatest gifts for analytic systematization of philosophy that have ever been seen, applied himself to the task. Thus, he developed Plato's dialectic method into the strict science of logic; Plato's "ideas," though shorn of the separate supramundane existence which Aristotle believed Plato attributed to them, survived in the Aristotelian "form" as opposed to "matter." Plato's school was known as the Academy (q.v.), and Aristotle's as the Peripatetic school.

With the death of Aristotle a new age begins. The fearless Greek genius which had soared to the contemplation of supreme ideas of good, of the form and end and cause of all existence, sank back to earth. As the great pre-Socratic movement terminated in the skepticism of the Sophists, so this greater movement found its natural reaction in the skepticism of Pyrrho and the later Academy. The post-Aristotelian school was predominantly ethical, sensationalist, and materialist, as contrasted with the more idealistic metaphysics of the preceding age. Of these schools the least original and the least important is the later Peripatetic. The most important name among the Skeptics is Pyrrho of Elis. The later development of the Academy may be divided into three schools—the old, the middle or Skeptic, and the reformed or Eclectic Academy. To the first belong the names of Speusippus, Xenocrates, and Polemo, who modified the Platonic doctrine mainly by the admixture of Pythagorean elements. The chief exponents of the middle Academy were Arcesilaus, Carneades of Cyrene, and his disciple, Clitomachus of Carthage, who neglected the positive doctrine of Plato and employed themselves mainly in a negative polemic against the dogmatism of the Stoics. The reformed Academy began with Philo of Larissa, the pupil of Clitomachus and teacher of Cicero.

But the two most important developments of the post-Aristotelian philosophy were Stoicism (see STOICS) and Epicureanism (q.v.). As the Greeks came in contact with other races, and the law of the state and the old religion of Greece were shaken, the need was felt of finding a substitute for these, a principle of conduct which should enable a man to stand alone and rise superior to circumstances. Such a principle the Stoics claimed to have found. Their great names are Zeno, the founder, Cleanthes of Assos, and Chrysippus of Soli, called the second founder; in Panætius of Rhodes and Posidonius of Apamea, Stoicism showed a softened and eclectic tendency.

The broad distinction noticed above between the Italic or Doric and the Ionic schools reappears in the marked contrast between the two later materialistic schools. The Stoics are Doric and Roman in character, the Epicureans are Ionic and Greek. "The one might be said to represent the law, the other the gospel of paganism." Epicureanism may be briefly described as a combination of the physics of Democritus with the ethics of Aristippus; its end was even more exclusively practical than that of the Stoics. After Epicurus himself the most distinguished members of the school were Metrodorus, Hermarchus, Colotes, and Leonteus.

But beneath the antagonism of the post-Aristotelian schools there was much in common, and a constant tendency, especially in the Academic and Stoic schools, to approximate to each other. The rise of the Roman power and the growing intercourse between Greece and Rome furthered a natural movement, on the one side towards Skepticism and on the other towards Eclecticism, as it was surmised that different schools presented different aspects of truth. A consideration of the latter (see ECLECTICISM), which is typified in Cicero, would carry us outside the limits of purely Greek philosophy, as would the later synthesis of the ideas of the East and the West, known as Neo-Platonism (q.v.). Consult: Mayor, *Sketch of Ancient Philosophy from Thales to Cicero* (Cambridge, 1881); Bender, *Mythologie und Metaphysik* (Stuttgart, 1899); Erdmann, *History of Philosophy*, vol. i (Eng. trans., London, 1890); Brandis, *Geschichte der Entwickelungen der griechischen Philosophie* (Berlin, 1862–64): Bakewell, *Source Book in Ancient Philosophy* (New York, 1907); Windelband, *Geschichte der antiken Philosophie* (3d ed., München, 1912; Eng. trans., New York, 1899); Jackson and Adams, *Texts to Illustrate a Course of Elementary Lectures on Greek Philosophy* (London, 1901–02); Benn, *The Philosophy of Greece* (ib., 1898); Burnet, *Early Greek Philosophy* (2d ed., ib., 1908); Gomperz, *Greek Thinkers* (4 vols., New York, 1901–11); Zeller, *Grundriss der Geschichte der griechischen Philosophie* (9th ed., Leipzig, 1908; Eng. trans., London, 1885); *Die Philosophie der Griechen in ihrer geschichtlichen Entwickelung* (4th ed., Leipzig, 1909; Eng. trans., with varying dates); and see the articles on the various schools and philosophers mentioned above.

GREEK POLITICAL PARTIES. See POLITICAL PARTIES, *Greece*.

GREEK RELIGION. As considered in this article, religion is a term to express the relations in which the Greek stood to his gods. Such relations are, of course, conditioned by the beliefs held at various times as to the nature, power, and attributes of these gods, and these beliefs in turn are expressed in forms of worship, in literature, and in life. In the developed civilization of Greece this religion is a complex organism made up of various elements which the complete absence of a system of theology has left unharmonized, so that few conceptions are sharply and consistently defined, while many of the details are hopelessly blurred. In spite, however, of this lack of precision, there is a certain unity in these religious views, and, as presented in literature and art, the Greek polytheism has proved a powerful factor in the development of modern civilization. So far, indeed, as the literature is concerned, it must be admitted that it presents to us rather the mythology than the religion of the Greeks, i.e., it gives less prominence to the belief in the gods as divinities than to the stories about them, in which the strictly religious element usually occupies but a small place. The nature and growth of myth are treated in the article on MYTHOLOGY, and the chief myths relating to the gods and heroes are to be found in the separate articles devoted to them. For the secret rites connected with Greek religion, see MYSTERIES.

The Greek was a deeply religious person. He had a strong sense of his weakness, as compared with the powers of nature by which he was surrounded, and gladly owned his dependence upon the divine beings by which he believed those powers to be controlled. The perception of the uncertainty of human fortune and its apparently arbitrary course undoubtedly led to fear of the might which could produce such sudden alternations of prosperity and adversity; yet it would be a mistake to regard this as the determining principle in the attitude of the Greeks towards their gods. In general, the relations between gods and men were friendly, and the wrath of the gods was directed against those who overstepped the limits assigned to human activities, and by overweening pride, reckless ambition, or even immoderate prosperity, excited the divine envy and brought Nemesis upon themselves. The words of Herodotus, "The god suffers none but himself to be proud," are the concise expression of a thought which is to be found throughout the whole range of Greek literature. While, therefore, fear was not prominent, there was a very distinct sense of human limitation; and the gods, as the single source of all that came to men, were approached with offerings and prayers either to win their favor for the future or in thanksgiving for the past. In front of every door stood the conical stone of Apollo Agyieus (Apollo of the Streets), and often a terminal figure of Hermes; in the court was the altar of Zeus Herkeios; at the hearth Hestia was worshiped; kitchen, storerooms, and bedchamber had their appropriate divinities. (See also GROVES, SACRED.) From birth to death there were few events in the life of a Greek in connection with which the gods were not remembered. And if this is true of the individual, much more is it true of the state. On the favor of the gods depended its existence; consequently the festivals of the gods were celebrated with devout regularity under the care of high officials, while rich offerings marked the public thankfulness for unexpected deliverance or unusual prosperity. (See FESTIVALS; GREEK FESTIVALS.) Thus, the Athenian victories over the Persians were commemorated by the erection of the colossal bronze Athena on the Acropolis and of a group of statues at Delphi, while the zenith of the Athenian Empire saw the erection of the Parthenon and the Propylæa on the Acropolis, as well as new temples at Eleusis, Rhamnus, and Sunium. The limits of this article prevent a more detailed statement, but any careful study of Greek private life and public institutions will show how closely religion was connected with both. Yet, in spite of this, sacerdotalism is almost unknown. At the seats of the Mysteries (q.v.) or the oracles (see ORACLE), such as Eleusis or Delphi, the priests were of course powerful, but in general they were merely official representatives of the community, chosen as other officials were or sometimes allowed to purchase their position. Even where the office was hereditary or confined to a certain family, it was not regarded as conferring on its possessor any peculiar knowledge of the will of the gods or special power to constrain them. The need of an intermediary between the worshiper and the god was not felt, nor was the exact performance of a complicated ritual required. It is sometimes said that the religion of the Greeks was independent of morality, and it must be admitted that many of the stories of the gods present them in a most unfavorable light. It may also be granted that the morality of the Greeks was not derived from their religion; but whatever the source of the Greek ideas about morals, they were early brought under the protection of the gods, who were deemed the special guardians of the unwritten laws by which human conduct was to be guided. The literature shows plainly that the effect of this was to lead the loftier minds to a higher conception of the gods themselves and to a rejection of the earlier legends which attributed to them acts offensive to a more developed moral sense. At the same time the absence of any belief in a revelation intrusted to a chosen few prevented the formation of any canonical system, and thus it is that, while the general attitude towards the gods remained much the same, there was a great diversity in many details. It is therefore very difficult to formulate briefly the Greek religious belief, since statements that are true for one time or place or social condition may be quite misleading if applied to another. The following characteristics may, however, be fairly said to belong to that religion during the greater part of the independent national life.

To the Greek, then, the gods were everywhere, all nature being full of divine life. They were innumerable, and naturally they differed much in rank. In later times we find a distinction between the gods (θεοί) and the daimones (δαίμονες), inferior spirits, usually malevolent, though the name "daimones" is also applied to a host of lesser powers occupying a place between the greater gods and men and including the heroes and spirits of the dead. These gods have full control over the world and the forces of nature, but the world is not their creation; they are immortal, but they have a beginning. The various cosmogonies and legends of successive dynasties of gods are, however, scarcely parts of the religious system. The gods were generally considered to have the form of men, though possibly of somewhat greater size (the huge dimensions assigned to Ares in the *Iliad* are quite exceptional). Though regarded as possessing unlimited powers of transformation, they are quite removed from the monstrous or grotesque; the Greek love of moderation is as influential in religion as in art or literature. In general, the gods were divided into those of the heaven, the earth, and the sea, though often the latter are omitted. The heavenly gods dwell in the sky, or on some lofty mountain, usually Mount Olympus (q.v.) in Thessaly. The earth or chthonic deities are conceived of as on or under the earth and naturally often include the heroes and the dead. It should be noted that the line between these classes is very indefinite, and the same divinity is found sometimes in one and sometimes in another. Space will permit only a brief outline of the grouping of the gods in the popular mythology. (See the separate articles on the gods named below.) At the head was Zeus, "father of gods and men," and the supreme ruler of the universe, though bound in some mysterious way by the decrees of fate. (See PARCÆ.) His wife was Hera, queen of heaven, and the special guardian of the sanctity of marriage. Associated with them as the chief divinities of heaven were Hephæstus, god of fire and the patron of the workers in metal; Athena, the virgin daughter of Zeus; Apollo and his sister Artemis; Ares, the god of war; Aphrodite, goddess of love; Hermes, the divine messenger; and Hestia, properly the sacred hearth itself, but later more or less clearly personified as the divine guardian of the hearth. Around these greater gods are grouped a host of lesser deities, some of whom enjoyed high honor in certain localities. Such are Helios, the sun, Selene, the moon, and other heavenly bodies; the attendants on the Olympians, as the Horæ or Seasons, the Charites or Graces, the Muses, Iris, Hebe, and Ganymede. The sea was ruled by Poseidon, the brother of Zeus, and second in power to him alone. With him was often worshiped his wife, Amphitrite, while about them were grouped the Nereids, the Tritons, and other less important sea gods. The chief chthonic divinities were Hades, the ruler of the lower world, and his wife, Persephone, the daughter of Demeter. Demeter herself was usually reckoned among the Olympians, but her sphere of activity was more closely connected with the earth, as the giver to men of grain and the knowledge of agriculture. On earth also belonged Dionysus, god of wine, with his bands of Mænads, Satyrs, and Sileni, though he, too, is frequently found with his father, Zeus, in heaven. Gæa, the earth mother, plays a larger part in legend than in cult, but Asclepius, the god of healing, Pan, the great god of the Arcadian herdsmen, and some others, seem to have been more frequently objects of worship than of narrative. Characteristic of the Greek religion is the specialized conception of each god, who is, on the whole, limited to a specific, though often wide, field of activity. Henotheism, so prominent in the Vedas, by which the special object of worship seems for the time being to possess all the powers of all the deities, is scarcely found in Greece, and it may well be doubted whether there is any real approach to monotheism outside of some of the philosophical schools. If we turn from the literature to the evidence afforded by inscriptions, or such works as the guidebook of Pausanias, it is at once clear that there were an immense number of local cults, sometimes attached to the names of the great gods, but more often connected with the name of some local hero, who was doubtless often an old divinity fallen from his high estate. Certainly the country population was far removed from any thought of one god.

It is a striking fact that at its first appearance in literature the Greek religious system had already received its definitive form. Some new divinities were introduced later, but the Homeric poems show us the hierarchy of the gods in substantially the organization which it retained till it was extinguished by the new faith. The origin of this religion was a mystery to the Greeks themselves, though they speculated not a little on the subject and in a somewhat crude form anticipated many later theories. Herodotus thought that many of the names of the gods had been learned from the Egyptians; Prodicus, the sophist, seems to have taught that the gods were mere personifications of the objects that brought blessings to men, such as the sun, air, light, agriculture, etc.; while Euhemerus gave elaborate expression to ideas long prevalent when he interpreted the myths as distorted history and the gods as idealized men of the past. It is not possible in this article to give a detailed survey of the many theories of Greek religion which have been advanced, only to be discredited. Two views were long prominent. One saw in the Greek religion only a corruption of an original revelation, and much ingenuity was displayed in tracing biblical teachings in the Hellenic myths. The other bore some relation to this in that it assumed that the Greek mythology and the popular beliefs were but the symbolic forms in which the priests clothed the most profound truths, which were too deep for the popular mind. The great exponent of this theory was Fr. Creuzer (q.v.), in *Symbolik und Mythologie der alten Völker* (2d ed., Darmstadt, 1820–24; Fr. ed., enlarged by Guigniaut, Paris, 1825–51); the theory exercised a powerful influence, however, during the earlier half of the nineteenth century, especially in the explanation of the Greek vases and other works of art. With the growth of the science of comparative philology and a clearer recognition of the connection between the Indo-European peoples, a flood of light was thrown on the names of many of the Greek gods; and as etymological identity with Vedic and sometimes northern deities seemed obvious in many cases, it was naturally believed that here at last was the key to unlock the past. Many of the Vedic deities are clearly personifications of the powers of nature, and this is doubtless true of some of the Greek gods, but the attempt to resolve the Greek religion into a pure nature worship has been unsuccessful. One difficulty is that original identity of name does not mean later identity in the conception of the deity to whom the name is attached. Dyaus and Zeus may be the same word, but the former is only a shadow in the Vedic mythology, while the latter is to the Greeks the greatest of the gods. An outcome of studies along etymological and ethnological lines is the view that Greek religion resulted from the blend of Indo-Germanic beliefs with the cult ideas and practices indigenous in the Mediterranean basis, the original inhabitants of that basin having been conquered by Indo-Germanic invaders. (See next paragraph.) Explanation has also been sought, with very good results, through the researches of anthropology into the primitive ideas of savage tribes and the survivals of primitive customs and superstitions among more civilized races. These studies have led to the theory which finds in *animism*, or worship of spirits, usually malevolent, the kernel of all religion and traces its development by a strict process of evolution. This undoubtedly explains much in Greek religious rites and conceptions, but it cannot be regarded as completely satisfactory. It seems as though the solution, if it can ever be reached, must be sought by a combination of these various lines. The names of the gods must be studied by the aid of comparative philology that the original conception embodied therein may be brought to light. Local cults, ritual usages, and superstitions must be collected and compared with similar rites among kindred or primitive peoples, and the history and development of the several myths examined. It is necessary, also, to consider the problem of foreign influence and contamination by the union of originally diverse conceptions under a common name. At one time the tendency was to explain everything as an importation; and in the reaction against this extravagance K. O. Müller and his followers doubtless went too far in their claim that all was autochthonous unless there is historical proof of foreign origin. Lately the tendency has been to admit a larger share of foreign influence, though it must not be forgotten that the Greeks assimilated and transformed whatever they derived from their intercourse with other nations.

In conclusion, it may be well to call attention to certain phases of Greek religion which preserve, within a system of anthropomorphic polytheism, apparently primitive elements, pre-anthropomorphic in character, which were forced into the background by the more highly developed cults. Prominent among these are the traces of fetishism in the numerous cases of sacred stones, which are sometimes called images of definite gods, as the pyramidal Zeus at Phlius, or the rough stones called Charites at the Bœotian Orchomenus, but are sometimes unnamed, like the Omphalos at Delphi. Excavations in Crete have shown that in the Mycenæan or Minoan period the sacred stone and pillar played a large part. The worship of trees has in most cases been transformed into the consecration of the tree to some god, as the olive to Athena and the laurel to Apollo. (Cf. Bötticher, *Baumkultus der Hellenen*, 1856; Frazer, *The Golden Bough*, in part the 3d ed., London, 1907–13. See Groves, Sacred.) Some have seen the source of anthropomorphic images of deities in the aniconic pillar or tree trunk. The numerous cases of animals sacred to a god seem also to contain reminiscences of an animal worship, of which there are, perhaps, indications in the Mycenæan age, but the proofs of primitive totemism in Greece are as yet very scanty. The worship of the souls of the dead, or, at any rate, their propitiation by offerings, was a large part of Greek religion, though it was less prominent than the more public rites. Greek ideas about the soul and the other world were indefinite, but it was certainly the popular belief that the soul survived the body and either hovered about the tomb or departed to a shadowy region, where it led a melancholy existence in need of the offerings brought by surviving relatives. It was evidently believed to have power to inflict injury, and it is also certain that proper funeral rites for the body were needed to insure its peace. In some cases the state paid divine honors to a departed soul, usually as a "Heros" (ἥρως), as the Athenians honored Sophocles. This worship is, of course, important from the point of view of the animistic theories. It is fully discussed by E. Rohde, in *Psyche* (2d ed., Freiburg, 1898). In recent time French scholars in particular have laid stress on the influence of the group in the formation of religion, on the principle that the key to religious practices lies in the social structure of the community that elaborates it. This view has found followers in England, notably in Miss Jane E. Harrison: consult her *Themis: A Study of the Social Origins of Greek Religion* (Cambridge, 1912). For a summary and criticism of the book, in many ways untrustworthy, consult Hewitt in *The Classical Weekly*, vii, 86–88 (New York, 1914).

Bibliography. The number of works is enormous, but most of those published before 1850 are antiquated, and many later works can be safely neglected. The following works treat the general subject with detail: Preller, *Griechische Mythologie* (Leipzig, 1854; 4th ed., vol. i by Robert, Berlin, 1894; the second volume, containing the discussion of the Heroes, is still unpublished); Gerhard, *Griechische Mythologie* (Berlin, 1854–55), still useful for the material therein collected; Welcker, *Griechische Götterlehre* (Bonn, 1857–63), a work which was the culmination of a life of study covering the whole poetry and art of the Greeks, as the source for a correct understanding of their religious beliefs; Decharme, *Mythologie de la Grèce antique* (2d ed., Paris, 1886), of value from its references to the treatment of mythology in art. The lectures of Max Müller and the works of Andrew Lang discuss some phases of Greek religion. The former is the coryphæus of the "comparative mythologists," while the latter writes from the anthropological point of view. Gruppe, in *Griechische Kulte und Mythen*, vol. i (1887), and in his "Griechische Mythologie," in vol. v of Müller, *Handbuch der klassischen Altertumswissenschaft* (Munich, 1897, 1902), has revived the prominence of foreign influence and collected much information on the religions of the neighboring peoples. The material is collected most completely in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1884 et seq.), and in the mythological articles in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft* (Stuttgart, 1894 et seq.). A narrower field is covered by such works as Nägelsbach, *Homerische Theologie* (2d ed., Nuremberg, 1861), and *Nachhomerische Theologie* (ib., 1857); Wide, *Lakonische Kulte* (Leipzig, 1893); Immerwahr, *Kulte und Mythen Arkadiens* (2 vols., Leipzig, 1891); Farnell, *Cults of the Greek States* (5 vols., Oxford, 1896–1909). The questions of primitive religious rites are treated by Mannhardt, *Wald- und Feld-Kulte* (Berlin, 1875–77), and Frazer, *The Golden Bough* (London, 1907–13). Of great importance, as treating the subject from a new standpoint, is Usener, *Götternamen* (Bonn, 1896), reviewed by Gildersleeve, in *American Journal of Philology*, vol. xvii (New York, 1896). The representations of the gods in art are collected in the unfinished work of Overbeck, *Griechische Kunstmythologie* (Leipzig, 1873–89), with a large folio atlas of plates. Consult also: Stengel, *Griechische Kultusaltertümer* (2d ed., Munich, 1898); Harrison, *Prolegomena to the Study of Greek Religion* (2d ed., Cambridge, 1908); Campbell, *Religion in Greek Literature* (London, 1898); De Visser, *De Græcorum Diis non referentibus Speciem Humanam* (Leyden, 1900); Ducharme, *La critique des traditions religieuses chez les Grecs des origines au temps de Plutarque* (Paris, 1904); Saussaye, *Lehrbuch der Religionsgeschichte* (Tübingen, 1904); Adam, *The Religious Teachers of Greece* (Edinburgh, 1909); Cumont, *Astrology and Religion among the Greeks and Romans* (New York, 1912); Fairbanks, *A Handbook of Greek Religion* (ib., 1910); Lawson, *Modern Greek Folklore and Ancient Greek Religion* (ib., 1910); Murray, *Four Stages of Greek Religion* (ib., 1912).

GREEK SLAVE, The. A well-known statue by Hiram Powers (q.v.).

GREEK VERSION. See Bible.

GREE′LEY. A city and the county seat of Weld Co., Colo., on the Cache la Poudre River, 52 miles north-northeast of Denver, on the Union Pacific, the Denver, Laramie, and Northwestern, and the Colorado and Southern railroads (Map: Colorado, E 1). It is the seat of the State Teachers College and has a public library and Lincoln and Island Grove parks. The city is the centre of a fertile irrigated belt and makes extensive shipments of potatoes, sheep and cattle, flour, wheat, etc. There are several lumber yards, a flour mill and elevator, a beet-sugar factory, etc. Settled in 1870, Greeley was incorporated in the following year. The government is administered under a revised charter of 1886 which provides for a mayor, elected biennially, and a city council. Pop., 1900, 3023; 1910, 8179; 1914 (U. S. est.), 10,376. The "Greeley Colony," named after Horace Greeley, was mainly composed of New England people. They were the first agricultural (irrigation) community in Colorado. Imbued with idealistic principles, they encountered with remarkable success, though not without many hardships and reverses, all the pioneer problems of the desert.

GREE′LEY, Horace (1811–72). An eminent American journalist, born in Amherst, N. H., Feb. 3, 1811, of Scottish-Irish ancestry. His father, Zaccheus Greeley, was a farmer whose unfertile acres kept him poor. Horace's early education was limited. In 1826 he entered the office of the *Northern Spectator* at East Poultney, Vt., and in 1830 he started out for himself as a journeyman printer, working at Jamestown and Lodi, N. Y., and then at Erie, Pa. In August, 1831, he went to New York City, where, after doing journeyman work in several offices, he founded, Jan. 1, 1833, with Francis V. Story and H. D. Shepard, the *Morning Post* (said to have been the first two-cent daily ever published), which failed within three weeks, and which was succeeded in March, 1834, by the *New Yorker*, confessedly the best literary paper in America at that time. Greeley also about this time contributed leading articles to the *Daily Whig*. In 1838–39 he also edited the *Jeffersonian*, a political weekly published at Albany, and in 1840 edited and published the *Log Cabin*, a weekly, in the interest of Harrison as a presidential candidate. These ventures prepared the way to the *Daily Tribune*, of which Greeley was at first sole proprietor and publisher, as well as chief editor, and the first number of which appeared April 10, 1841, followed in the autumn by the *Weekly Tribune*, into which the *New Yorker* and *Log Cabin* had been merged. The *Weekly* ultimately circulated widely throughout the Northern and Western States and came to wield an influence unprecedented in the history of American journalism, Greeley thus becoming a recognized power in national as well as State politics.

In December, 1848, Greeley entered Congress, to fill a vacancy, and served until March 4, 1849. He was quick to discern and point out the evils and abuses of existing institutions, but he was neither a revolutionist nor an iconoclast. Though not in the strict sense of the word an abolitionist, he was an opponent of slavery, and foremost among those who sought to resist its extension to the territory acquired from Mexico. From 1850 to the end of the conflict the *Tribune*, under his direction, did much to strengthen the antislavery sentiment of the Northern people and to prepare them for the great struggle that ensued. In this Greeley was ably assisted by an unusual corps of editorial workers, including Bayard Taylor, Charles A. Dana, James S. Pike, and George Ripley. In addition to its championship of the antislavery cause, the *Tribune* became prominent through its advocacy of protection, and the extraordinary hold of the weekly edition upon the farming class was due in no small measure to the attention which the interests of agriculture received in its columns. It is said, by men who shared Greeley's confidence, that though he was too proud to be an applicant for any office or to take any step to secure a nomination, he yet felt very keenly the neglect of others to recognize his honorable claims for promotion upon the parties he served so faithfully and well. He was a delegate from Oregon to the Republican National Convention at Chicago in 1860, his own State refusing to send him, and was influential in bringing about the nomination of Lincoln in preference to Seward. When, after Lincoln's election, the South threatened to secede from the Union, he declared that if a majority of the people of any State, after full and free discussion, should sincerely and deliberately vote to leave the Union, he was willing that they should withdraw. He declared "that he hoped never to live in a Republic whereof one section was pinned to the other by bayonets." He held, however, that the votes actually taken at the South did not express the real convictions of the majority, but were the result of terrorism and panic; and when the Civil War broke out, he lent his voice and influence to the support of the government in its efforts to suppress the Rebellion by force.

He had a keen sense of the horrors of a civil war and was willing to adopt any reasonable and rational plan to avert them. The war once begun, he was in favor of its vigorous prosecution and impatient with what seemed to him unreasonable slowness on the part of the government. At times he was much discouraged and disposed to think that, to avoid worse calamities, the war should be ended by some compromise short of the result most to be desired. It was this feeling that made him willing to go to Canada in 1864, with the unofficial sanction of Lincoln, to hold a conference, which proved fruitless, with George N. Sanders, Jacob Thompson, and Beverly Tucker, the Confederate agents, on the subject of peace. At the close of the war he advocated the doctrine of universal amnesty and universal suffrage. He held that the prolonged imprisonment of Jefferson Davis, without indictment or trial, was a palpable infraction of the Sixth Amendment of the Constitution, and he therefore joined with Gerrit Smith and others in signing the bail bond of the late head of the Confederacy. This action, in the existing state of public sentiment at the North, brought upon him much odium. In 1861 he was a candidate for the Republican nomination for United States Senator, but was defeated by Ira Harris. In 1864 he served as a presidential elector and in 1869 was the unsuccessful Republican candidate for Comptroller of the State of New York. In 1870 he was a candidate for Congress in the sixth New York district, but was defeated, the district being overwhelmingly Democratic. He nevertheless ran 300 votes ahead of the Republican State ticket. In 1872 he was opposed to the renomination of General Grant for a second term and coöperated with a body of Liberal Republicans who held a convention in Cincinnati, on May 1, in advance of the regular Republican convention, to nominate another candidate. On the sixth ballot the nomination fell to Mr. Greeley and was accepted by him. Much doubt has been expressed with regard to the wisdom of Mr. Greeley in allowing himself under the circumstances to be made a candidate for President upon the platform adopted by this party (see LIBERAL REPUBLICAN PARTY); but he himself considered that he thereby merely reaffirmed the principles for which he had contended as a Republican, and that he neither made nor proposed any concession whatever to those who had opposed and resisted these principles. When the Democratic party adopted that platform in its entirety and without qualification, and nominated him as their candidate for President, he recognized the political unwisdom of their action, but accepted it as the sign and pledge of a new departure and believed that if he should be elected there would be an end of all political schemes having their root in the spirit of slavery and calculated to array the South against the North. A man of sensitive spirit and of great pride, he was deeply wounded, disappointed, and mortified on finding himself accused by many of his old friends of having thrown away his principles and of having entered into a conspiracy to turn over the government of the country to the control of the men who had instigated the Civil War. On the other hand, he received only a half-hearted support from the Democrats. The popular vote cast for him amounted to 2,834,079, against 3,597,070 for General Grant; but the only States carried by him were Georgia, Kentucky, Maryland, Missouri, Tennessee, and Texas. He had overtasked his powers for many years. Near the close of the campaign he was called upon to watch at the bedside of his dying wife. During the whole contest his powers of endurance were strained to the utmost, and when it was at last over, he was prostrated by a disorder of the brain, and, sinking rapidly, died on Nov. 29, 1872. He published: *Hints toward Reforms* (1850); *Glances at Europe* (1851); *History of the Struggle for Slavery Extension or Restriction in the United States* (1856); *Overland Journey to San Francisco* (1860); *The American Conflict* (2 vols., 1864–66); *Recollections of a Busy Life* (1868; new ed., 1873); *Essays Designed to Elucidate the Science of Political Economy* (1869); *What I Know of Farming* (1871). Consult the biographies of Greeley by Parton (New York, 1855; new ed., Boston, 1872); Reavis (New York, 1872); Ingersoll (Chicago, 1873); Zabriskie (New York, 1890); Linn (ib., 1903). Consult also *A Memorial of Horace Greeley* (ib., 1873), and Benton, *Greeley on Lincoln* (ib., 1893).

GREELY, ADOLPHUS WASHINGTON (1844–). An American Arctic explorer, soldier, and scientist. He was born in Newburyport, Mass., where he received a high-school education. Serving in the Civil War, he was thrice wounded and was brevetted major before he was 21. In the regular army, after frontier services, he was during 38 years subordinate and then chief of the Signal Corps. Within this time he established the flood or danger lines of the great rivers and reorganized the service in many respects. He commanded (1881–84) the expedition to Lady Franklin Bay, this being one of 15 international stations established for scientific work under the plans of the Hamburg International Polar Conference of 1879. Scientifically the Greely expedition made the nearest gravity observations to the pole, ascertained the climatic conditions of Grinnell Land, made glaciological studies, determined the hitherto unknown secular magnetic variation of that region, and through its tidal observations first disclosed the conformity of the sidereal day with the diurnal inequality of the tidal waves of the earth. Although primarily scientific, the explorations of the expedition covered unknown lands one-eighth the way round the globe north of the eighteenth parallel. The discoveries included the interior of Grinnell Land, the shores of the western polar sea, and the extension of Greenland to within 15 miles of its extreme northern latitude. The attainment by Lockwood and Brainard of Greely's command of the then farthest north, 83° 24′ N., in May, 1882, wrested from England an honor held for three centuries; it is the only world's record verified by a later explorer. Unvisited by the promised relief ships of 1882 and 1883, Greely withdrew his party from Lady Franklin Bay, and, after a 400-mile journey, landed at Cape Sabine, where, however, he found neither relief nor promised supplies. During nine months of waiting 18 of the 25 men perished; the survivors were rescued by Commodore W. S. Schley. Scientific observations ceased 40 hours before the rescue. Greely was thanked by the British government, received the Founder's medal of the Royal Geographical Society, the Roquette medal from the Société de Géographie, and was honored by seven other foreign societies for his Arctic work. Contrary to popular belief, he received no recognition from the United States, his work being in the line of duty. In 1887 he was appointed Chief Signal Officer of the army by President Cleveland, being the first enlisted man of the Civil War to reach the grade of general in the regular army. Under Greely, as subordinate and chief, were built 21,000 miles of military telegraph lines, in the United States, Cuba, Porto Rico, China, the Philippines, and the unique Alaskan system of land, cable, and wireless, where first was operated commercially a long wireless section. During the Spanish-American War Greely was charged with the censorship of cables; in 1906, with the rank of major general, he was in command at San Francisco for 10 weeks after the earthquake and fire; in 1907 he successfully terminated without bloodshed the Ute campaign in Wyoming; in 1908 he was retired for age. He became a member of the International Colonial Institute, and seven times represented his country abroad, the last time at London as military Ambassador at the coronation of George V. His publications include: *Three Years of Arctic Service* (2 vols., 1885); *American Weather* (1890); *American Explorers and Travelers* (1894); *Handbook of Polar Discoveries* (1896; 5th ed., enlarged, 1910); *Handbook of Alaska* (1912; new ed., enlarged, 1914); and numerous reports of much value, among which are: *Diurnal Fluctuations of Barometric Pressure* (1891); *Proceedings of the Lady Franklin Bay Expedition* (1888); *Rainfall of Western States and Territories* (1888); *Discussion of International Simultaneous Meteorological Observations, 1878–87* (1891); and *Climatology of Arid Regions* (1891). He also compiled *Public Documents of the First Fourteen Congresses, 1784–1817* (1900), and was a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA. Consult Schley, *The Rescue of Greely* (New York, 1885).

GREEN (AS. *grēne*, OHG. *gruoni*, Ger. *grün;* connected with AS. *grōwan*, OHG. *gruoan*, to grow). The color which is found on the spectrum between the blue and the yellow and is known as the color of grass and other vegetable substances, as well as that of the minerals chrysocolla and malachite. It may be made artificially by mixing varying proportions of blue and yellow pigments. Among the more important green pigments which are of mineral origin are the following: *arsenical green*, or *Scheele's green*, a precipitate obtained from a solution of copper sulphate when treated with a mixture of arsenious oxide and potassium carbonate dissolved in hot water; *Paris green, emerald green, imperial green, Mitis green*, or *Schweinfurth green*, made by boiling concentrated solutions of arsenious oxide in copper acetate; *Brunswick green* when pure consists of the oxychloride of copper, but the term is commonly used for mixtures of Prussian blue and chrome yellow; *chrome green*, either the green chromium sesquioxide, or a mixture of chrome yellow and Prussian blue; *Gellert's green*, a mixture of cobalt blue and zinc oxide; *Guignet's green*, a pure chrome green made in the dry way from potassium dichromate and boric acid; *mountain green*, any native earthy green mineral, such as chrysocolla, glauconite, or malachite; *Prussian green*, or *Hooker's green*, a mixture of gamboge and Prussian blue; *verdigris*, basic acetate of copper, made by exposing metallic copper to the fumes of acetic acid; *terra verde*, an earthy pigment containing ferrous silicate. The green vegetable dyestuffs have been superseded by artificial coal-tar derivatives. See COAL-TAR COLORS; DYEING.

GREEN, ALICE SOPHIA AMELIA (MRS. JOHN RICHARD) (1849–). A British historian, born in Kells, Ireland, the daughter of Edward A. Stopford, archdeacon of Meath. In 1877 she was married to John Richard Green, author of the famous *Short History of the English People*, for which, in the edition of 1888, she wrote a memoir of her husband; with Miss Norgate she edited (1900) his *Oxford Studies*. In 1913 she received the degree of Litt.D. from the University of Liverpool. Among her own historical works are: *Henry II* (1888), in "Twelve English Statesmen"; *Town Life in the Fifteenth Century* (1894); *The Making of Ireland and its Undoing* (1908); *Irish Nationality* (1911), which, like the preceding volume, is strongly colored by her ardent Irish nationalism; and *The Old Irish World* (1912).

GREEN, ANDREW HASWELL (1820–1903). An American lawyer, financier, and philanthropist, born in Worcester, Mass., and educated at the Worcester Academy. He studied law and practiced in New York City, acting as executor of the Tilden, Ogden, and other large estates. In 1856 he was president of the New York City Board of Education; was president of the Central Park Board from 1857 to 1870, and comptroller from 1871 to 1876. He managed the city's finances in the face of enormous deficits made by the peculations of the Tweed ring and reëstablished its credit. In 1868 he proposed the plan for a "Greater New York," afterward initiated in 1897, and he also originated the plan of forming the New York Public Library out of the Astor, Tilden, and Lenox foundations. He founded the New York Zoölogical Society, assisted in the establishment of the Metropolitan Museum of Art and the Museum of Natural History, and gave great aid to many charitable institutions in New York City. Through mistaken identity he was killed by a deranged negro.

GREEN, ANNA KATHARINE. See ROHLFS, ANNA KATHARINE.

GREEN, ASHBEL (1762–1848). An American Presbyterian clergyman and educator, the son of Jacob Green. He was born at Hanover, N. J., served in the Revolution, graduated at Princeton in 1784, and afterward became professor of mathematics and of natural philosophy there. He was then for some time a Presbyterian pastor in Philadelphia and in 1792 was chaplain of Congress. From 1812 to 1822 he was president of the College of New Jersey (now Princeton University), at the same time being president of the Board of Trustees of Princeton Theological Seminary. Beginning in 1822, he edited the Philadelphia *Christian Advocate* for 12 years. Among his works are: *Presbyterian Missions* (1820) and a *Discourse Delivered in the College of New Jersey, with a History of the College* (1822). Consult Jones, *Life of Ashbel Green* (New York, 1849).

GREEN, BARTHOLOMEW (1666–1732). An American printer and publisher, born at Cambridge, Mass. He succeeded to his brother's printing business in 1690 and established himself first in Boston and then in Cambridge with his father, Samuel Green. About 1692 he resumed printing in Boston. On April 24, 1704, the *Boston News Letter*, the first, and for many years the only, continuous newspaper in the British colonies, appeared from his press, published for John Campbell, postmaster. Afterward it became Green's property and became widely known for the independence and originality of its political and religious utterances. Excepting the period from November, 1707, to October, 1711, this paper was printed by Green and his successors until 1776. Green printed the Bible and several religious tracts in the Indian language, with accompanying English translations. Consult Littlefield, *The Early Massachusetts Press*, vol. ii (Boston, 1907).

GREEN, Beriah (1794–1874). An American reformer, born at Preston, Conn. He graduated at Middlebury College, Vt., in 1819, and then studied for the ministry at Andover Theological Seminary (1819–20), but his religious beliefs did not agree with any denominational creed. In 1821 he was made professor of sacred literature in Western Reserve College, though his violent opposition to slavery caused him to leave that institution after a few months. From 1823 to 1834 he was president of Oneida Institute in Ohio. He exerted a great influence in antislavery circles, served as president of the National Antislavery Convention which assembled in Philadelphia in 1834, and was one of Garrison's warmest friends. His writings include a *History of the Quakers* (1823) and *Sermons and Discourses, with a few Essays and Addresses* (1833).

GREEN, Duff (1791–1875). An American politician and journalist, born in Woodford Co., Ky. He was educated in the country schools and was himself engaged in teaching on the outbreak of the War of 1812, in which he served in the Kentucky militia. After the war he removed to Missouri, where he again taught school and studied law at the same time. He took an active part in the movement that led to the admission of Missouri as a State, was a member of the convention that drew up the State constitution, and after its admission was, in 1823, elected to the State Senate. In the same year he became editor and proprietor of the St. Louis *Enquirer*, and two years later removed to Washington, D. C., where he purchased the *United States Telegraph*. After the accession of President Jackson in 1829, the *Telegraph* supplanted Gale's *National Intelligencer* as the administration organ and enjoyed government patronage that is said to have amounted to $50,000 a year. Green himself became one of the confidential advisers of the President and was a member of his famous "Kitchen Cabinet." After the open break between Calhoun and Jackson the *Telegraph* was bitter in its attacks on the latter and Van Buren, as a result of which the government printing was taken away from it and given to the *Globe*, which had been established as the Jackson organ, with Francis P. Blair as its editor. Green continued in control of the *Telegraph* until 1835, making it the most bitter and violent exponent of the Nullificationists. From 1835 to 1838 he edited a paper in the same interest, known as the *Reformation*, after which he spent some years in Europe engaged in various business enterprises. In 1844 he returned to the United States and established a short-lived newspaper, the *Republic*, in New York City. He was twice sent on special diplomatic missions to Mexico. In his later years he was active in the industrial development of the South, was largely interested in railroads in Georgia, and was one of the founders of the town of Dalton, in that State, where he died. Considerable information concerning him may be found in Benton, *Thirty Years' View* (2 vols., New York, 1854–56).

GREEN, George (1793–1841). An English mathematician, born at Sneinton. He was educated at Cambridge, devoted himself largely to original research in mathematics, and presented important papers before the Cambridge Philosophical Society. His *Essay on the Application of Mathematical Analysis to the Theories of Electricity and Magnetism* (1828)—in which the potential function first was introduced into the mathematical theory of electricity and magnetism—remained unnoticed until 1846, when it was reprinted by Lord Kelvin, as in the meantime his general theorems had been discovered by Kelvin, Chasles, Sturm, and Jauss. Other important papers were: *On the Reflection and Refraction of Light at the Common Surface of Two Non-Crystallized Media* (1837); *On the Reflection and Refraction of Sound* (1837); *On the Propagation of Light in Crystalline Media* (1839). Although he held no university position and died at the early age of 47, he contributed greatly to the progress of the science of mathematics, of which he was one of the foremost representatives of his day in England. Green's *Mathematical Papers*, with a memoir, were published in 1871 by N. M. Ferrers.

GREEN, Hetty Howland Robinson (1835–1916). An American financier. She was born at New Bedford, Mass., and was educated at Mrs. Lowell's School in Boston. Her father, Edward Mott Robinson, left her a large fortune when he died in 1865. She married Edward H. Green (died 1902) in 1867. Mrs. Green came to be known as the richest woman in America and as the greatest woman financier anywhere. She managed personally her interests in Chicago and New York real estate and her property in stocks and bonds in many large corporations.

GREEN, Jacob (1722–96). An American patriot, born at Malden, Mass. He graduated at Harvard in 1744, entered the Presbyterian ministry in 1745, and became pastor of a church of that denomination at Morristown, N. J. In 1758–59 he was vice president of the College of New Jersey (now Princeton University). In 1775 he was sent as a delegate to the New Jersey Provincial Congress and was chairman of the committee appointed to draft a State constitution. A series of articles by him on the question of the depreciation of paper money was widely read at the time, and his plan therein suggested for the redemption of the continental currency was similar to that later followed by Congress. He further published two volumes of *Sermons* (1768, 1769) and other works.

GREEN, John Richard (1837–83). An English historian. He was born at Oxford, Dec. 12, 1837. His education, except some two or three years of private instruction, was received in his native city, at Magdalen College School, and at Jesus College, where he graduated in 1859. His interests were historical rather than scholastic. Religious, and raised in Tory and High Church principles, he took orders in 1860 and for the next five years lived in East London. In 1866 he became vicar of St. Philip's, Stepney. His health failing, and his inclination to a clerical life abating, he resigned in 1869 to become librarian at Lambeth, devoting himself henceforth to history and politics. His first important historical work, *A Short History of the English People*, was the outcome of his desire to leave behind him some of his accumulations of knowledge in a form easily available to ordinary people. He rewrote it twice and was only persuaded to publish it in 1874. Its object, as the title suggests, was to give the story of social development of the conditions which affected the lives of the great mass of the people, in preference to mere dynastic or military chronicles. While it is not infallible in detail, its great merit is the attractive vividness with which it presents one picture after another of the past. It had a great and immediate success and was ultimately expanded, still keeping the same point of view, into the four-volume *History of the English People* (1877–80), in which he received much assistance from his wife, Alice, daughter of Archdeacon Stopford, whom he married in 1877. A visit to Egypt in 1881 aggravated his lung trouble and made labor very difficult for the rest of his life. His courage, however, enabled him to persist in the writing of another work of a less popular and more scholarly nature, *The Making of England* (1882), which came down to the consolidation of the kingdoms under Egbert. The materials for the subsequent volume, *The Conquest of England,* down to the coming of the Normans, were so far put together that his widow was enabled to publish it in the year of his death (1883). His *Stray Studies in England and Italy* (1876) was a collection of essays marked by notable historical insight. In spite of his ill health the brilliancy of his conversation and the breadth of his sympathy gave him a marked influence, especially among the historical students of his generation. Consult James Bryce, *Studies in Contemporary Biography* (New York, 1903).

GREEN, Joseph (1706–80). A satirical verse writer of the Revolutionary period in America, born in Boston and educated at Harvard. He was banished for his Loyalist sympathies, but he returned to the popular side, and his pen spared neither party in such works as *The Wonderful Lament of Old Mr. Tenor* (1744) and *Poems and Satires* (1780).

GREEN, Joseph Reynolds (c.1860–1914). An English botanist, born in Stowmarket, Suffolk, and educated at Trinity College, Cambridge. From 1887 to 1907 he was professor of botany to the Pharmaceutical Society of Great Britain; in 1895 he became a fellow of the Royal Society and in 1902 a fellow of Downing College, Cambridge. Among his publications, important particularly for physiological botany, are: *Manual of Botany* (1895); *The Soluble Ferments and Fermentation* (1899; German, *Die Enzyme,* 1901, by Windisch); *Introduction to Vegetable Physiology* (1900); *Primer of Botany* (1910); *History of Botany from 1860–1900* (1910), continuing the work of Sachs.

GREEN, Mary Anne Everett (1818–95). A minor English historian, who wrote under her maiden name, Wood. She was born at Sheffield. Educated at home and in the British Museum, she was an industrious compiler, editor, and biographer, conscientious in original research; wrote for the reviews; and made exhaustive calendars of state papers. In 1845 Miss Wood married an artist, George Pycock Green, in London, but continued her work in the Public Record Office for 40 years. Her *Lives of the Princesses of England* was published in six volumes (1849–55); her *Letters of Royal Ladies* appeared in 1846. She edited the letters and diaries of many distinguished persons and was herself highly esteemed as a linguist, antiquary, and philanthropist. Her *Elizabeth, Electress Palatine and Queen of Bohemia* (1909) appeared posthumously.

GREEN, Norvin (1818–93). An American capitalist, born at New Albany, Ind. He graduated in medicine from the University of Louisville in 1840 and practiced until 1853. He served as a Representative in the Kentucky Legislature in 1849, 1850, and 1868. Entering the telegraph business in 1854, he became president of the Southwestern Telegraph Company, organized in 1856. Later he arranged a system of mutual patronage between six leading telegraph companies including his own. When these companies were reorganized in 1866 as the Western Union Telegraph Company, Green became one of the vice presidents, serving until 1870 and again from 1873 to 1878, when he succeeded to the presidency of the corporation. In 1870–73 he was head of the Louisville, Cincinnati, and Lexington Railroad. From 1884 to 1886 he served as president of the American Institute of Electrical Engineers.

GREEN, Samuel Swett (1837–). An American librarian, born at Worcester, Mass. He graduated from Harvard College in 1858 and from Harvard Divinity School in 1864. From 1871 to 1909, when he retired, he was librarian of the Worcester Free Public Library, and for many years after 1890 he was a member of the Free Public Library Commission of Massachusetts. One of the founders of the American Library Association, he was its president in 1891 and in 1893 presided over the World's Congress of Librarians at Chicago. Besides his papers on library economy, he is author of *Library Aids* (1881; 2d ed., rev. and enlarged, 1883); *Libraries and Schools* (1883); *The Public Library Movement in the United States, 1853–1893* (1913).

GREEN, Seth (1817–88). An American pisciculturist. He was born in Rochester, N. Y., and was educated in the public schools there. Beginning at 20 years of age, he devoted his life to the artificial propagation of fish and the breeding of the better kinds for stocking lakes and streams. After many experiments he succeeded in hatching enormous numbers from the spawn of shad, trout, and other species, with which he stocked the Connecticut, the Hudson, the Potomac, the Susquehanna, and many other streams. He also introduced shad into Pacific coast waters. He was appointed one of the fish commissioners of New York in 1868 and soon afterward was made superintendent of the State fisheries. He received several medals from France and other honors and was the author of *Trout Culture* (1870) and *Fish Hatching and Fish Catching* (1879).

GREEN, Thomas Hill (1836–82). An English philosopher, born in Birkin, Yorkshire. He was educated at Rugby and Oxford, was elected fellow of Balliol College in 1860, tutor there in 1866, and Whyte professor of moral philosophy in 1878. A disciple of Wordsworth, Kant, and Hegel, he turned his critical powers upon their opponents, the empiricists. He maintained that empiricism disintegrates all experience into isolated sensations, and fails to explain how such sensations can constitute a knowledge of an ordered objective world. This knowledge, he maintained, presupposes the existence of a timeless intelligence as the essential principle of all cognitive beings. This eternal principle, as it appears in finite beings, is a "reproduction" of the one timeless omniscience which is the indispensable condition of the existence of the world of nature. And not only human knowledge, but also human volition, points to this eternal spirit, for a timeless principle is necessary to change a natural animal want into such motives as determine the will. So influential was Green's teaching that there grew up a body of thinkers, first at Oxford, then elsewhere, who are united in maintaining Green's fundamental doctrine of the eternal consciousness as the postulate of experience. These thinkers form what is sometimes called the Neo-Hegelian school. Edward Caird, F. H. Bradley, B. Bosanquet, John Watson, D. G. Ritchie, Josiah Royce, and other English and American philosophers have been influenced by Green's views, although in many cases the systems resulting show much originality. Green is supposed to be the original of "Mr. Grey" in Mrs. Ward's *Robert Elsmere.* Green's works include an *Introduction to Hume's Treatise of Human Nature* (1874), *Prolegomena to Ethics* (1883), and lectures, posthumously published under the editorial supervision of Nettleship (1885–88). His *Works* were published in three volumes (New York, 1906). Consult the biographical sketch contained in vol. iii of these collected works; also Fairbrother, *The Philosophy of T. H. Green* (London, 1896); A. Seth, *Hegelianism and Personality* (Edinburgh, 1887); Ritchie, "The Political Philosophy of T. H. Green," in *The Principles of State Interference* (London, 1891); Sidgwick, *Lectures on the Ethics of T. H. Green, etc.* (London, 1902); Upton, "The Theological Aspects of the Philosophy of T. H. Green," in *The New World,* i (Boston, 1892); Muirhead, *Four Lectures on the Political Teaching of T. H. Green* (London, 1908).

GREEN, Valentine (1739–1813). An English engraver, born at Salford in Oxfordshire. He studied line engraving under Robert Hancock at Worcester and then went to London in 1765, where he devoted his attention to engraving in mezzotint. His large plates after West's "The Return of Regulus to Carthage," and "Hannibal Swearing Eternal Enmity to the Romans," attracted much attention. In 1775 he was appointed mezzotint engraver to the King and afterward obtained the privilege of engraving the pictures in the Düsseldorf Gallery. The siege of that city by the French 20 years later put a stop to this work, but he had already executed 22 plates. A descriptive catalogue of these was published in 1793. His 400 or more plates include many after Reynolds, Romney, Gainsborough, and Italian and Dutch artists. They are rich in tone, clever in effects of light and shade, and vigorous in treatment. He was also a writer on antiquarian and similar subjects and fellow of the Society of Antiquaries and of the Royal Society. Consult his biography by Whitman (London, 1902). His son Rupert (c.1768–1804), an engraver, assisted him in much of his work.

GREEN, William Henry (1825–1900). An American Presbyterian theologian. He was born in Groveville, N. J., graduated at Lafayette College in 1840, and in 1846 at Princeton Theological Seminary, where he was appointed instructor in Hebrew. From 1849 to 1851 he was pastor of the Central Presbyterian Church of Philadelphia. He then became professor of biblical and Oriental literature in Princeton Seminary. In 1868 he declined the presidency of Princeton College and was, because of his seniority, for many years the official head of the seminary. The most distinguished scholar in this country among those who held the traditional orthodox view of inspiration, he was chairman of the American Old Testament Revision Company. He published: *A Grammar of the Hebrew Language* (1861); *The Pentateuch Vindicated from the Aspersions of Bishop Colenso* (1863); *A Hebrew Chrestomathy* (1865); *The Argument of the Book of Job Unfolded* (1874); *Moses and the Prophets* (1883); *Hebrew Feasts* (1885); *The Higher Criticism of the Pentateuch* (1895); *The Unity of the Book of Genesis* (1895); *A General Introduction to the Old Testament* (2 vols., 1898–99).

GREEN ALGÆ. See Chlorophyceæ.

GREEN'AWAY, Kate (1846–1901). An English illustrator and painter in water color. She was born in London and received her first instruction from her father, John Greenaway, a wood engraver and draftsman. Afterward she went to Heatherley's Art School and studied at South Kensington and under Legros in the London Slade School. She first exhibited, at the Dudley Gallery in 1868, a water-color drawing called "Kilmeny." She continued to exhibit for many years, both at the Academy and the Water-Color Society, and her designs and illustrations became very popular on the Continent and in America as well as in Great Britain. She conducted an interesting correspondence with Ruskin, who praised her work highly in his *Præterita* and *Fors Clavigera.* Her special field is the delineation of child life, and her drawings are distinctive for their individual charm and quaint humor. Her draftsmanship and color are skillful and delicate, and her work possesses a grace and freshness that won immediate recognition. Of late years other influences have superseded hers, but she retains a unique place among English artists. Her first successful illustrations were drawn for *Little Folks* and other magazines, and she illustrated a number of children's books, such as Madame d'Aulnoy's *Fairy Tales* (1871); *The Quiver of Love,* with Walter Crane (1876); Lady Colin Campbell's *Topo* (1878); Jane and Anne Taylor's *Poems* (1883); etc. Among her most successful works were *Under the Window* (1879), of which 150,000 copies are said to have been sold; *Mother Goose; A Day in a Child's Life* (1881); *A Painting Book of Kate Greenaway* (1884); *Language of Flowers* (1885); Browning's *Pied Piper of Hamelin* (1879); and *Kate Greenaway's Almanacs* (1883–97). Consult Spielmann and Layard, *Kate Greenaway* (New York, 1905); *Kate Greenaway: Sixteen Examples in Color of the Artist's Work* (London, 1910).

GREEN'BACK' PARTY. In American political history, a party organized to further the increased use of a "greenback" currency and a completer recognition of such currency as a legal tender. After the close of the Civil War the rise in the gold value of United States notes, or "greenbacks" (see Money), occasioned much distress in the States of the Middle West, where business operations had become adjusted to the high scale of prices prevailing during the war. An Act of 1866 which aimed gradually to retire the greenbacks awakened a great deal of opposition; and when it was proposed, in 1868, to make the bonds not specifying the medium of payment payable in coin, what was denominated the

"Ohio idea"—a demand that all such bonds should be payable in greenbacks at the option of the government—gained vogue, controlling the Democratic National Convention, although Seymour, who was opposed to it, received the presidential nomination. The discussion of the Resumption Bill in 1874 led to a revival of the greenback agitation. On Nov. 24, 1874, a convention, national in scope, met at Indianapolis and advanced three propositions: (1) that the note circulation of State and national banks should be prohibited; (2) that the only paper currency should be greenbacks, exchangeable on demand for bonds bearing interest at 3.63 per cent; (3) that coin should be used to pay only the interest on the national debt and the principal of bonds expressly payable in coin. The supporters of these views were at first inclined to attach themselves to the Democratic party; but when it became clear that Tilden would be the nominee of the party, they withdrew and formed the Independent party, more generally known as the Greenback party. In 1876 they nominated for the presidency Peter Cooper, of New York, who received 81,737 popular votes, chiefly from the Middle West. The labor troubles of 1877 led to the formation of numerous local workingmen's parties, which united with the Greenbackers and created the National, or Greenback-Labor, party in 1878. In the elections of the same year this party controlled a popular vote of more than a million, and elected 14 Congressmen. In 1880 the party nominated for President James B. Weaver, of Iowa. He received a popular vote of 300,867, the number of Greenback-Labor Congressmen being reduced to eight. In 1884 Gen. B. F. Butler was nominated by the Greenbackers, as also by the anti-Monopolists, and received 175,380 votes. After that year the party ceased to exercise independent influence, generally becoming merged with the Democrats in the North and the Republicans in the South. Consult T. H. McKee, *National Conventions and Platforms of all Political Parties, 1789–1905* (6th ed., Baltimore, 1906), and E. B. Usher, *The Greenback Movement of 1874–84, and Wisconsin's Part in it* (Milwaukee, 1911).

GREEN'BACKS'. A name popularly applied to the legal-tender notes first issued by the United States government during the Civil War. The printing upon the back of these notes has always been in green ink, which explains the origin of the term. For the history of these issues, see MONEY.

GREEN-BARKED ACACIA, ȧ-kā'shȧ *or* ȧ-kā'shĭ-ȧ. See PARKINSONIA.

GREEN BASS. A local name for the large-mouthed black bass. See BASS.

GREEN BAY. A city, port of entry, and the county seat of Brown Co., Wis., at the head of Green Bay and at the mouth of Fox River, 113 miles north of Milwaukee, on the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern, the Green Bay and Western, and the Kewaunee, Green Bay, and Western railroads (Map: Wisconsin, E 4). Among the noteworthy features are the Kellogg Public Library, municipal, courthouse, and Federal buildings, three large hospitals, while just beyond the city limits is the State Reformatory. There are six bridges, three each across Fox and East rivers. The capacious harbor admits the largest lake steamers, and the city carries on an extensive trade in lumber, coal, fish, and grain. The manufactured products include lumber, canned goods, beer, paper, boilers, gas engines, flour, furniture, and woodworking machinery. For these there is ample water power. The government is administered under a charter of 1882, revised in 1896, by an annually elected mayor and a unicameral council, which elects the school board, assessors, street superintendent and assistant, fire chief, and poor commissioner, and confirms the executive's appointments to the board of health, police board, and police officers. Pop., 1900, 18,648; 1910, 25,236; 1914 (U. S. est.), 28,046.

Green Bay is built near the site of an ancient Indian village, which was visited by Nicollet in 1639, and at which, in 1669, Father Allouez established a Jesuit mission, where, by 1673, over 2000 Indians had been baptized. In 1680 a military station was established here by Tonty; but both mission and fort seem to have been deserted by 1730, and the first permanent settlement in Wisconsin was made here by Langlade in 1745. In 1761 the English took possession and built Fort Edward Augustus (abandoned in 1763); in 1796 they surrendered the place to the Americans, who in 1816 built Fort Howard on the west side of Fox River, around which a settlement grew. The first newspaper in Wisconsin was published here in 1833. Green Bay was incorporated as a borough in 1838 and in 1854 was chartered as a city. Fort Howard was united with Green Bay in 1896. Consult: Durrie, *Green Bay for Two Hundred Years, 1639–1839* (Madison, Wis., 1872), and an article, "The Old Town of Green Bay," in *Magazine of American History*, vol. xxiii (New York, 1889); A. C. Neville, *Some Historic Sites about Green Bay* (Madison, 1906).

GREEN BAY. A large arm of Lake Michigan, extending from the northwestern part of the lake 120 miles southwest into Wisconsin (Map: Wisconsin, F 4). It is 10 to 20 miles wide, and its great depth (over 110 feet) gives the water a green color, whence its name. At its northern end are two deep indentations, Big Bay de Noquette and Little Bay de Noquette. Across its mouth lies a chain of islands, of which the largest are Washington Island, Martin's Island, and Summer Island. It receives the Fox River (q.v.) at the city of Green Bay.

GREEN'BONE', or **GOREBILL.** Names in England for the gar (*Belone vulgaris*). See GAR.

GREEN'BRI'ER. See SMILAX.

GREENBRIER MOUNTAINS. A ridge west of and parallel with the main chain of the Alleghany Mountains, in Greenbrier Co., W. Va. (Map: West Virginia, D 4). Greenbrier, the highest point of the ridge, is 3359 feet high. Near it is situated Greenbrier White Sulphur Springs, one of the most frequented and fashionable of West Virginia spas.

GREENBRIER RIVER. A tributary of New River, the head stream of the Kanawha River (q.v.), W. Va. (Map: West Virginia, D 3). It is formed by the confluence of the West Fork and the East Fork, in the Shaver's Mountains in Randolph County, and after a southwesterly course through a picturesque valley between the main Alleghanies and the Greenbrier Mountains (q.v.) flows into New River near Hinton in Summers County.

GREEN'BUSH, N. Y. See RENSSELAER, N. Y.

GREEN'CASTLE. A city and the county seat of Putnam Co., Ind., 39 miles west of Indianapolis, on the Vandalia Line, the Cleveland, Cincinnati, Chicago, and St. Louis, and the Chicago, Indianapolis, and Louisville railroads (Map: Indiana, D 5). It is the seat of the De Pauw University (q.v.) and has a Carnegie library. The most important manufactures include lumber, lightning rods, flour, kitchen cabinets, handles, and drag-saws. Greencastle was settled in 1822 and was incorporated in 1849. Under a charter revised in 1895 the government is administered by a mayor, elected every two years, and a municipal council. Pop., 1900, 3661; 1910, 3790.

GREEN COVE SPRINGS. A town and the county seat of Clay Co., Fla., on the St. John's River, 29 miles by rail south of Jacksonville, on the Atlantic Coast Line (Map: Florida, E 2). It is a popular resort, noted for a warm sulphur spring which is frequented because of its medicinal properties, and has a public library and a courthouse. The town is engaged chiefly in growing fruits and vegetables and in lumbering. It has adopted the commission form of government. The water works and electric-light plant are owned by the municipality. Pop., 1900, 929; 1910, 1319.

GREENE, ALBERT GORTON (1802–68). An American minor poet, born in Providence, R. I. He graduated at Brown in 1820, was admitted to the bar in 1823, and from 1832 he held the clerkship of the town as well as that of the municipal court of Providence, of which he was chosen judge in 1858. After his health failed in 1867, he removed to Cleveland, where he died. He was actively interested in education, aided in founding the Providence Athenæum, and was president of the Rhode Island Historical Society. He began the important collection of American poetry now in the library of Brown University and known as the Harris collection. He was the author of several popular poems, especially "Old Grimes" and "The Baron's Last Banquet."

GREENE, CHARLES EZRA (1842–1903). An American civil engineer, born in Cambridge, Mass. He graduated at Harvard in 1862 and at Massachusetts Institute of Technology in 1863, served as quartermaster during the last two years of the Civil War, and was United States assistant engineer from 1870 to 1872, when, for part of a year, he was city engineer of Bangor, Me. In the same year he became connected with the engineering department of the University of Michigan, later being appointed dean, a position which he filled until his death. He was an associate editor of the *Engineering News* in 1876–77. His publications include: *Graphical Method for the Analysis of Bridge Trusses* (1875); *Trusses and Arches: Graphics for Engineers, Architects, and Builders* (3 vols., 1876–79; 3d ed., 1903); *Notes on Rankine's Civil Engineering* (1891); *Structural Mechanics* (1897; 2d ed., 1905).

GREENE, CHARLES GORDON (1804–86). An American journalist, born at Boscawen, N. H. He assisted his brother, Nathaniel Greene, in editing the Boston *Statesman*, and then, after short engagements on the Taunton *Free Press* (1825) and the Boston *Spectator* (1826), he settled in Philadelphia in 1827, and started the *National Palladium*, in which the presidential candidacy of Andrew Jackson was vigorously advocated. In 1828 Greene was on the staff of the *United States Telegraph* in Washington, until after Jackson's election, when he returned to the Boston *Statesman*, of which he later became the proprietor. He founded the Boston *Post* in 1831 and conducted it until 1875, served in the Massachusetts Legislature, and was naval officer of Boston from 1853 to 1861.

GREENE, CHARLES WARREN (1840–). An American journalist and author, born at Belchertown, Mass. He graduated at Brown University and received his M.D. from Dartmouth College (1867). He wrote much on natural science for encyclopædias and was an editor of various works. His writings include, in addition to those referred to, *Animals: Their Homes and Habits* (1886) and *Birds: Their Homes and Habits* (1886).

GREENE, CHARLES WILSON (1866–). An American professor of physiology and pharmacology, born in Crawford Co., Ind. He graduated from De Pauw University Normal School in 1889, from Leland Stanford in 1892, and from Johns Hopkins (Ph.D.) in 1898. He taught at De Pauw normal and preparatory schools in 1889–91, and at Stanford between 1891 and 1900, when he became professor of physiology and pharmacology at the University of Missouri. From 1901 to 1911 he also carried on investigations for the United States Bureau of Fisheries. His researches cover the structure and function of phosphorescent organs in the toadfish, the circulatory system of the hagfish, the physiology of the Chinook salmon, and the influence of inorganic salts on the cardiac tissues. He is editor of Kirke's *Handbook of Physiology* (8th ed., 1914) and is author of *Experimental Pharmacology* (1905; 3d ed., 1909) and *Textbook of Pharmacology* (1914).

GREENE, CHRISTOPHER (1737–81). An American soldier, born in Warwick, R. I. He served in the Colonial Legislature of Rhode Island from 1770 to 1772 and in 1775 became a lieutenant of the Kentish Guards, organized in Kent County. He was rapidly promoted, displayed great courage at Bunker Hill, and was captured during General Arnold's attack upon Quebec. He was made colonel in 1776 and in October of the same year was assigned to the command of Fort Mercer on the Delaware River, which he gallantly defended against a Hessian attack in 1777. Late in 1780 he was ordered south to aid Gen. Nathanael Greene and in May, 1781, was killed at his post on the Croton River, Westchester Co., N. Y.

GREENE, DANIEL CROSBY (1843–1913). An American Congregational missionary, born at Roxbury, Mass. He graduated from Dartmouth College in 1864, served in the Civil War as a private, and in 1869 went to Japan as a missionary under the American Board. He lived at Kobe in 1870–74, at Yokohama in 1874–80, and was professor of Old Testament exegesis at Kyoto in 1881–87. From 1873 to 1880 he served as a member of the Yokohama New Testament translation committee, and in 1908–09 he lectured at Harvard University. He edited *The Christian Movement in Japan* (2d ed., 1904; 3d ed., 1907), revised Ritter's *History of the Protestant Missions in Japan* (1898), and is author of *Chinese New Testament Prepared for Japanese Readers* (1878) and *Course of Study for Students of Japanese Language* (1903).

GREENE, EDWARD LEE (1843–1915). An American botanist, born at Hopkinton, R. I. He graduated at Albion College, Wis., in 1886, studied for the ministry, and was an Episcopal clergyman from 1871 to 1885, when he became a Roman Catholic. From 1885 to 1895 he was associate professor of botany at the University of California, in 1895–1904 at the Catholic University in Washington, D. C., and in 1904 became associate in botany at the Smithsonian Institution. In 1893 he was president of the International Congress of Botanists, assembled in connection with the World's Columbian Exposition at Chicago. He wrote: *Illustrations of West American Oaks* (1889–90); *Flora Franciscana* (1891); *Pittonia* (5 vols., 1887–1903); *Leaflets of Botanical Observation* (2 vols., 1903–09); *Landmarks of Botanical History* (1909); "An Autobiography," in *Roads to Rome in America* (1909); besides numerous contributions to taxonomy in various serial publications.

GREENE, Francis Vinton (1850–). An American soldier and author, son of Gen. George Sears Greene, born in Providence, R. I. He graduated at West Point in 1870. After two years in the artillery service he was transferred to the United States Corps of Engineers (1872) and was assistant astronomer and surveyor on the Northwest boundary survey (1872–76). During the Russo-Turkish War he was military attaché to the United States Legation at St. Petersburg and, after accompanying the Russian army in the field from the Danube (July, 1877) to Constantinople (March, 1878), received from the Emperor the decorations of St. Vladimir and St. Anne for bravery at the battles of the Shipka Pass and Philippopolis. In 1886 he resigned from the army, but during the Spanish-American War he served in the Philippines and received the commission of major general after the capture of Manila. He retired again in 1899. In 1903 he became police commissioner of New York City. His publications include a series of works on military campaigns, including *The Russian Army and its Campaigns in Turkey* (2 vols., 1879); *Army Life in Russia* (1881); *The Mississippi Campaigns of the Civil War* (1882); *Life of Nathanael Greene, Major-General in the Army of the Revolution* (1893); *The Revolutionary War and the Military Policy of the United States* (1911).

GREENE, George Sears (1801–99). An American soldier and civil engineer, father of Gen. Francis V. Greene. He was born in Warwick, R. I., graduated at West Point in 1823, where for several years he was an instructor, and in 1836 resigned from the service to become a civil engineer. He was engaged in the construction and location of railroads in Maine, Massachusetts, Rhode Island, New York, and Maryland until 1857, when he entered the service of the Croton aqueduct department of New York City. He subsequently built the reservoir in Central Park and the enlargement of High Bridge. In 1862 he reëntered the Union army as colonel of the Sixtieth New York Volunteers, was made a brigadier general soon afterward, commanded his brigade at Cedar Mountain, and led a division at Antietam. At Gettysburg he was stationed on the right wing of the Federal army, and on the night of July 2, 1863, withstood an attack by a superior force of Confederates. In September of the same year (1863) he was transferred to the West, and on October 28, during an engagement near Chattanooga, received a wound which disabled him till January, 1865. He then joined General Sherman's army in North Carolina and took part in the operations leading to General Johnston's surrender. In 1866 he retired from the army and was chief engineer and commissioner of the Croton aqueduct department from 1867 until 1871, when he was appointed chief engineer of public works in Washington, D. C. General Greene designed the plan for the entire sewerage of that city (1871–73). From 1875 to 1877 he was president of the American Society of Civil Engineers.

GREENE, George Washington (1811–83). An American historian, grandson of General Nathanael Greene, born at East Greenwich, R. I. He was educated at Brown University and subsequently spent several years in study and travel in Europe. From 1839 to 1845 he was United States Consul at Rome. He returned to America in 1848 to accept the chair of modern languages at Brown University, which he resigned in 1852 to devote his time to historical writing. In 1872 he became nonresident professor of American history at Cornell University. In addition to two textbooks of botany and a French grammar, he edited *The Works of Addison* (6 vols., 1853) and published a number of historical works, of which the most important are: *Historical Studies* (1850); *History and Geography of the Middle Ages* (1851); *Biographical Studies* (1860); *Historical View of the American Revolution* (1865); *Life of Nathanael Greene* (3 vols., 1867–71); *The German Element in the War of American Independence* (1876); *Short History of Rhode Island* (1877).

GREENE, Nathanael (1742–86). An American general. He was born Aug. 7, 1742, at Potowomut, Warwick Co., R. I. His father was a leading preacher among the Quakers and educated his son very simply, training him from childhood to work on his farm and at his anchor forge and gristmill. By his own perseverance, however, the son acquired considerable knowledge of ancient and English history, geometry, law, and moral and political science. In 1770 he was chosen a member of the Rhode Island Assembly, was reëlected in 1771, 1772, and 1775, and, to the great scandal of his fellow Quakers, was among the first to engage in the military exercises preparatory to resisting the mother country. In 1774 he enlisted as a private in an independent company, the Kentish Guards, and in 1775 was appointed to the command of the Rhode Island contingent sent to the army at Boston, with the rank of brigadier general. He was promoted to be major general on Aug. 9, 1776, and was placed in command of the troops on Long Island. In the affair of Harlem Heights, where he was for the first time under fire, he handled his command with skill and valor. The movements by which the British General Howe tried to turn the flanks of the American army forced Washington to withdraw the greater part of his forces into New Jersey, leaving Greene in command of the remainder near Fort Washington on the Hudson. As the obstruction to navigation had been removed by the British, Greene's position was much exposed, and he was authorized to fall back across the river. The matter was left to his discretion, however, and he deemed it inadvisable to retire at the time. Preparations were made to defend the fort, but it was invested by Howe's forces and was compelled to surrender on Nov. 16, 1776, after a spirited conflict. (See Fort Washington.) In the New Jersey campaign of 1776–77 Greene distinguished himself, particularly at Trenton and Princeton. At the battle of Brandywine he was in command of a reserve force; at Germantown he commanded the left wing, and was vigorously pressing the enemy when a panic seized a brigade of militia, which gave way, and the American forces were compelled to retire, which they did in good order, General Greene commanding the rear guard. In 1778 he reluctantly consented to act as quartermaster-general at a time when the administration of that department was difficult. His particularly noteworthy service was rendered after he succeeded General Gates on Oct. 30, 1780, in the command of the Army of the South. Congress vested in him authority to raise supplies, appoint officers, and command all the troops raised or to be raised in six States. Gates had just been completely defeated by Cornwallis at the battle of Camden (Aug. 16, 1780), and Greene, upon his arrival in North Carolina in December, 1780, found the army in a wretched state. By dint of great activity he got his troops into better condition and remained for a short time on the defensive. In the meantime the prospects of the Americans had been improved by the decisive victory at King's Mountain (Oct. 7, 1780) and by Morgan's overthrow of Tarleton at Cowpens (Jan. 17, 1781). Nevertheless, Cornwallis forced Greene northward into Virginia; but Greene, being reënforced, reëntered North Carolina and took his stand at Guilford Courthouse. Battle was joined here (March 15, 1781), and, although Greene retired from the fight, he remained in control of much of North Carolina, while Cornwallis found it expedient to move northward into Virginia. Carrying the war into South Carolina, Greene was defeated by Cornwallis' successor, Rawdon, at Hobkirk's Hill (April 25, 1781); but he held his own in a severe battle at Eutaw Springs against Stuart (Sept. 8, 1781) and secured finally the exclusion of the English forces from all of Georgia and the Carolinas except three coast towns. Congress struck and presented to him a medal in honor of this battle, and the Carolinas and Georgia made him valuable grants of land. When peace was restored in 1783, Greene returned to Rhode Island, where he received numerous testimonials of the public admiration. In 1785 he retired with his family to his estate in Georgia, where he died of sunstroke, June 19, 1786. As a soldier, Greene was fitly described by his distinguished opponent Cornwallis as being "as dangerous as Washington, vigilant, enterprising, and full of resource." He also possessed many of the qualities of a statesman, was well balanced, full of tact, a master of the countless details involved in raising troops in a country not wholly patriotic or friendly to the cause, in impressing Congress with the needs of the army, and in harmonizing the conflicting policies of the new States. Consult: Francis V. Greene, *General Nathanael Greene* (New York, 1893), in the "Great Commanders Series"; G. W. Greene, *The Life of Nathanael Greene* (3 vols., ib., 1867–71); and, less favorable to Greene, McCrady, *History of South Carolina in the Revolution* (ib., 1902).

GREENE, NATHANIEL (1797–1877). An American journalist, brother of Charles Gordon Greene. He was born in Boscawen, N. H., became an apprentice in the office of the *New Hampshire Patriot* in 1809, and in 1812 edited the Concord *Gazette.* After conducting several other local papers he founded in 1821 the Boston *Statesman*, a prominent Democratic organ. He was for 15 years postmaster of Boston and published several translations: Sforzosi's *History of Italy* (1836); *Tales from the German* (1837); *Tales from the German, Italian, and French* (1843); *Improvisations and Translations* (1852).

GREENE, ROBERT (c.1560–92). An English poet and dramatist, born at Norwich. He was placed at St. John's College, Cambridge, where he graduated B.A. in 1579. He then traveled in Spain and Italy. On his return he reëntered the university and took the degree of M.A. at Clare Hall in 1583. He was also incorporated at Oxford in 1588. Soon after leaving Cambridge he proceeded to London, where he supported himself by his pen. He died of a debauch, Sept. 3, 1592. As a dramatist, Greene was one of the precursors of Shakespeare. Of his five plays, the best known is *The Honorable Historie of frier Bacon* (performed in 1594 and perhaps earlier). In this play a story of necromancy is fused with a tender idyl. The romance *Pandosto* (1588) contributed incidents to Shakespeare's *Winter's Tale. Menaphon* (1589), containing much beautiful verse, is one of the best of the Elizabethan romances. Greene wrote many pamphlets, of which *A Groatsworth of Wit Bought with a Million of Repentance* (published just after his death, 1592) was immensely popular for 50 years. It contains the first undoubted allusion to Shakespeare after he came to London. Though Greene's life was dissipated, his writings are singularly pure. Consult: *Plays and Poems*, ed. by Dyce (London, 1831); *Complete Works*, ed. by Grosart for the "Huth Library" (15 vols., ib., 1881–86); by J. C. Collins (2 vols., Oxford, 1905); and by T. H. Dickinson (London, 1909).

GREENE, SAMUEL DANA (1840–84). An American naval officer, born in Cumberland, Md. In 1859 he graduated at the United States Naval Academy as a midshipman and two years later became a lieutenant. During the battle between the *Monitor* and the *Merrimac*, March 9, 1862, he had charge of the *Monitor's* guns and commanded the Union vessel after the disabling of Lieutenant Worden (q.v.). He served throughout the war on various vessels, was assistant professor of mathematics at the Naval Academy from 1866 to 1868 and of astronomy from 1871 to 1875, was promoted to be commander in 1872, and acted as assistant superintendent of the institution from 1878 to 1882.

GREENE, SARAH PRATT McLEAN. See McLEAN.

GREENE, WILLIAM BATCHELDER (1819–78). An American author, son of Nathaniel Greene (1797–1877). He was born in Haverhill, Mass., studied at West Point, and served in the Florida War. He was connected with the Brook Farm movement, graduated at the Harvard Divinity School in 1845, and became a Unitarian clergyman. In the Civil War he was colonel and then brigadier general of volunteers, but resigned in 1862. Among his works are: *The Sovereignty of the People* (1863); *Transcendentalism* (1870); *Theory of the Calculus* (1870); *Socialistic, Communistic, Mutualistic, and Financial Fragments* (1875).

GREENE, WILLIAM CORNELL (1851–1911). An American capitalist, born in Westchester Co., N. Y. He became a government contractor in Colorado and then went into ranching in Arizona. Eight copper mines, located by him in the State of Sonora, Mexico, brought him a fortune. Several mining and cattle companies were organized by him, and in 1892 he headed a syndicate of four men to purchase for ranch purposes a tract of 7,500,000 acres in Sonora; but at this time, when the Greene holdings amounted to $100,000,000, of which Greene himself owned more than a half, a systematic attack by John

W. Gates and others, followed by the panic of 1907, caused the loss of most of his power and much of his property.

GREEN EARTH. A name frequently applied to the mineral glauconite (q.v.). The name is also applied to pulverulent varieties of the minerals chrysocolla and malachite, especially when they are used in their natural condition as pigments. Another name for these earths is *mountain green.*

GREEN EB'ONY. The wood of *Jacaranda ovalifolia*, a tree of the Bignonia family, which is exported in considerable quantity from South America. It yields olive-green, brown, and yellow colors in dyeing, but is also employed to some extent by turners and carpenters. The wood is hard and of an olive-green color. The tree has showy, panicled flowers. *Brya ebenus*, a West Indian leguminous tree, furnishes a fine quality of green ebony. The name is also applied to the wood of other trees that has a greenish color. See Ebony.

GREENE'S MET'AMOR'PHOSIS. See Alcida.

GREEN'FIELD. A city and the county seat of Hancock Co., Ind., 21 miles east of Indianapolis, on the Pittsburgh, Cincinnati, Chicago, and St. Louis Railroad (Map: Indiana, F 5). It has a public library and a fine high-school building. The city is surrounded by a farming district, and manufactures fruit jars, bottles, foundry products, and bricks. Greenfield, incorporated as a city in 1876, is governed under the original charter, which provides for a mayor, elected every four years, and a unicameral council. The city owns and operates its water works and electric-light plant. Greenfield is the birthplace of James Whitcomb Riley. Pop., 1900, 4489; 1910, 4448.

GREENFIELD. A town and the county seat of Franklin Co., Mass., 56 miles by rail west of Fitchburg, on the Connecticut and Deerfield rivers, and at the junction of two divisions of the Boston and Maine Railroad (Map: Massachusetts, B 2). It has manufactures of taps and dies, cutlery, machinists' tools, machinery, silverware, jewelry, agricultural implements, woodenware, paper boxes, bricks, cement building blocks, and children's carriages. The town has an extensive park system, the county hospital, and a public library. The government is administered by annual town meetings. Greenfield was settled in 1686, but remained a part of Deerfield until 1753. During Shays's Rebellion a body of insurrectionary troops was quartered here. Pop., 1900, 7927; 1910, 10,427; 1914 (U. S. est.), 11,492. Consult Holland, *History of Western Massachusetts* (Springfield, 1855), and Thompson, *History of Greenfield* (1904).

GREENFIELD. A village in Highland Co., Ohio, 74 miles east-northeast of Cincinnati, on the Baltimore and Ohio Southwestern and the Detroit, Toledo, and Ironton railroads, and on Paint Creek (Map: Ohio, D 7). It has manufactories of sweat collar pads for horses, show cases, oil cans and other cans, and woodenware novelties. Settled about 1802, it is governed under a charter of 1850 by a mayor and a city council. The village contains a fine high-school building. Pop., 1900, 3979; 1910, 4228.

GREEN'FINCH', or **GREEN LIN'NET.** 1. A familiar European finch (*Chloris chloris*), common in Great Britain. It is of a prevailing green tint, mingled with gray and brown. Its song is not very sweet, but in confinement it readily imitates the songs of other birds and in consequence is a favorite cage bird. 2. In the Rio Grande valley the name "greenfinch" is given to a totally different bird (*Arremonops rufivirgatus*), allied to the chewink (q.v.). This bird, also called Texas sparrow, is about 6½ inches long, olive green in color, with rufous markings on the head and yellow on the wing. See Grosbeak.

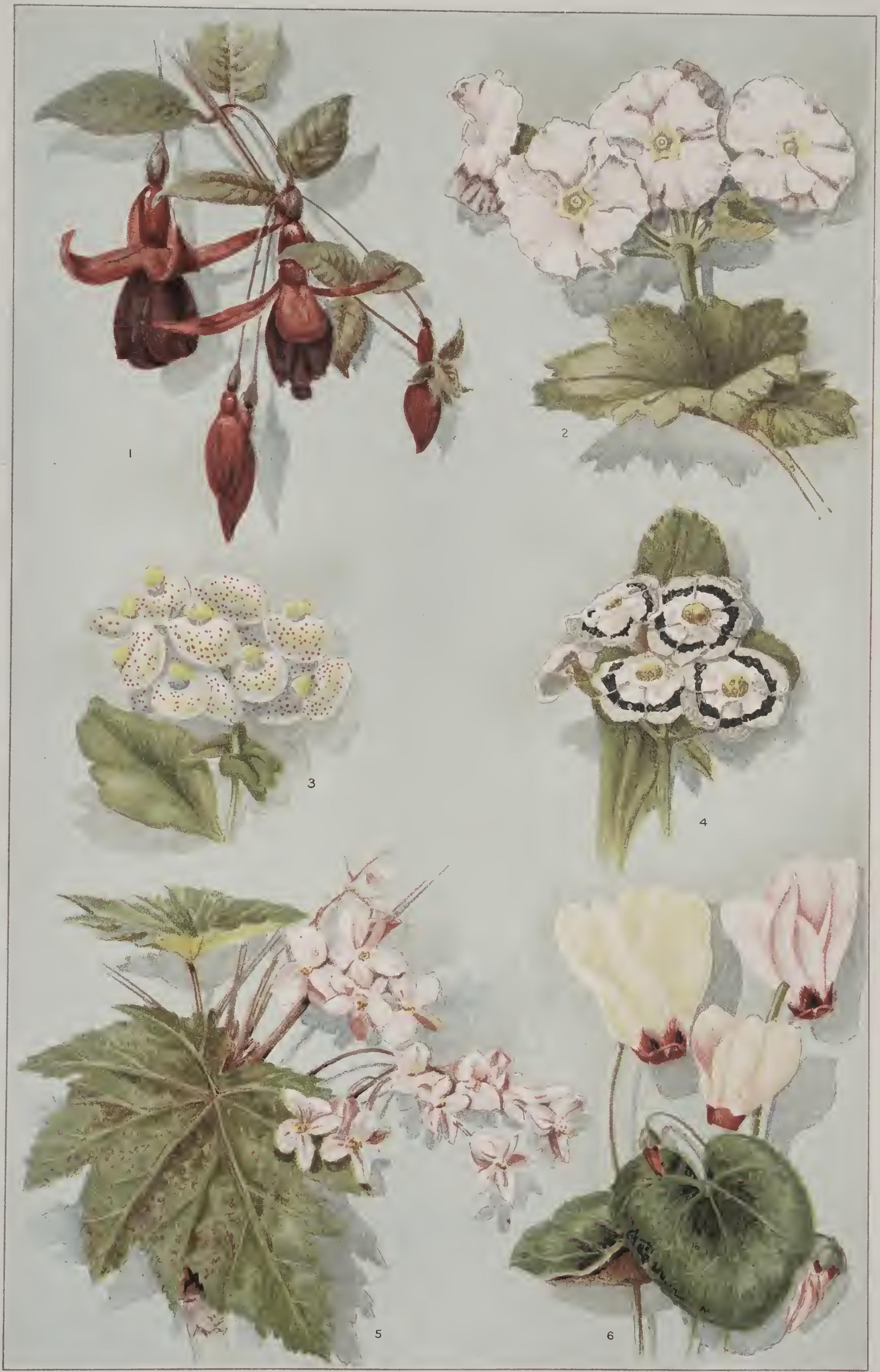
GREENFISH. 1. A Southern name for the bluefish (q.v.). 2. The pollack (q.v.), called also green cod and gray cod.

GREEN FROG, or **SPRING FROG.** One of the most familiar and widespread of North American frogs (*Rana clamitans*), occurring in all kinds of waters throughout the eastern United States and Canada. The male is about 3 inches long, the female ½ inch longer. In color it is brilliant green on the head and shoulders, above, passing into brownish olive posteriorly; below, white, the throat citron yellow; sides and thighs blotched or barred. The ear drum of the male is very large, one-fourth greater than the large eye; in the female it is smaller. This frog is aquatic and does not gather in large companies. Its only notes are an occasional "chug" and a sharp cry, uttered as it leaps into the water. It can make very long leaps and is a rapid and skillful swimmer. For a very full account of the life of this frog, consult Dickerson, *The Frog Book* (New York, 1906).

GREEN'HALGE, Frederick Thomas (1842–96). An American politician, born in Clitheroe, England. He was early brought to America by his parents, studied for about three years at Harvard, and, when his father failed in business, in 1863, went to Newbern, N. C., where he entered the Commissary Department of the Federal army. Soon afterward, having contracted a fever, he returned North. He studied law and was admitted to the bar in 1865. After he had occupied a number of minor political offices, he was elected mayor of Lowell in 1879, being reelected in 1881. In 1884 he was elected to the Massachusetts House of Representatives; in 1888 he was sent as a Republican to Congress, where he took a prominent part in the debates on the Free Coinage Bill, the McKinley Tariff Bill, and the Force Bill; and from 1894 until his death he was Governor of Massachusetts. Consult Nesmith, *The Life and Works of Frederick Thomas Greenhalge* (Boston, 1897), and a sketch in Lodge, *A Fighting Frigate and Other Essays and Addresses* (New York, 1902).

GREEN'HEART', or Bebeeru (*Nectandra rodiœi*). A valuable timber tree of the family Lauraceæ, a native of northern South America, which also yields a medicinal bark. The timber is commonly called greenheart; the bark is better known as bebeeru (otherwise beebeery, bibiru, bibiri, etc., and sipiri or sipeira); and the alkaloid to which it chiefly owes its properties is called *bebeerine.* The tree grows chiefly in British Guiana and in the greatest perfection on the low hills immediately behind the alluvial lands; it rises with an erect, slightly tapering trunk to a height of 40 or 50 feet without a branch, attaining a height of 80 or 90 feet in all and a diameter of 3, or even 4, feet. The leaves are thick, oblong-elliptical, and shining; the flowers, yellowish white, in axillary clusters; the fruit, which is about the size of a small apple, contains a single seed, about as large as a walnut. The fruit is intensely bitter, but con-

GREENHOUSE PLANTS



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1 FUCHSIA - (MONARCH)
2 PRIMULA - (CHINESE)
3 CALCEOLARIA
4 AURICULA - (GRAY-EDGED)
5 BEGONIA (PAUL BRUANT)
6 CYCLAMEN

tains a form of starch used as food by the natives. The wood is extremely strong and hard and is exported to be used chiefly by turners for the same purposes as lignum vitæ, like which it sinks in water. It is also remarkable for its durability, for being almost exempt from the attacks of the white ants on land and of the teredo in water, and for the high polish it will take. It is used in Guiana for shipbuilding and for all the most important purposes for which timber is required. Greenheart, by reason of its great durability in water, is extensively used for wharves, docks, canal locks, etc., being thus employed in the Liverpool docks and Manchester Ship Canal locks. It is specified for sills and fenders in the locks of the Panama Canal. The wood has been reëmployed after service of 50 years or more, when locks were enlarged. The *Fram*, Nansen's ship, and the *Discovery*, used in Antarctic explorations, were both built of greenheart. The bark has a very bitter, somewhat astringent taste. Its tonic and febrifugal properties resemble those of cinchona bark, although it is less reliable as an antiperiodic. The bark, as well as its alkaloid, is seldom used in medicine. A second alkaloid, nectandrine, found in the bark, has somewhat similar properties. South America produces a number of species of *Nectandra*. *Nectandra puchury major* and *minor* yield the seeds called pitchurim beans, which are astringent, are regarded as febrifugal, and are prescribed in dysentery, diarrhœa, etc., and the oil of which is used as a substitute for chocolate.

GREEN'HILL, Sir George (1847–). A British mathematician and physicist. He served as professor of mathematics at the Artillery College, Woolwich, and became a member of the aëronautical committee. He was knighted in 1908. His publications include: *Differential and Integral Calculus, with Applications* (1885; 3d ed., 1896); *Applications of the Elliptic Functions* (1892); *A Treatise on Hydrostatics* (1894); *Notes on Dynamics* (2d ed., 1908); *Report on Theory of a Stream Line, with Application to an Aëroplane* (1910); *The Dynamics of Mechanical Flight* (1912).

GREEN'HOUSE'. A general name given to glass buildings in which exotic and other tender plants, or plants out of their season, are grown. It embraces such structures as forcing houses, conservatories, hothouses, stove houses, orchard houses, graperies, bark stove houses, warm houses, etc. In its original sense, a greenhouse was a place in which plants were kept alive or green, but not expected to grow, and in this sense it is similar in meaning to conservatory. According as the temperature is raised above this point the structure becomes a hothouse or forcing house. The roofs, and generally the sides and ends of such plant houses, are made of glass supported by wooden or metal sash bars or rafters. The glass, besides making the house light, prevents the escape of much of the heat derived from the sun. When heat from this source is not sufficient for the purpose of the house, artificial heat is supplied. In the simpler and smaller structures this is furnished by fermenting horse manure, tanbark, or other organic material. Stove houses, or dry stoves, formerly heated by flues which extended from end to end of the house, are used for growing the more tender plants. In recent times the better houses are heated by hot water or steam, conducted through iron pipes. Modern greenhouses are characterized by great simplicity of construction; the framework is usually of wood or iron and wood, and very light considering its strength, and the glass of large dimensions.

GREEN'HOUSE' PLANTS. Plants commonly cultivated under glass for decorative purposes, either for their attractive foliage or their flowers or both. With few exceptions the species are natives of the tropics and the warmer parts of the temperate zone. There are many thousands of species raised in America and foreign conservatories, among the most popular being those figured upon the accompanying plate and described under their respective titles.

GREEN'HOW, Robert (1800–54). An American physician and historian, born in Richmond, Va. He was educated at William and Mary College, and afterward in New York, where he took his medical degree at the College of Physicians and Surgeons. He lectured upon scientific and other subjects and was an accomplished linguist. He published a *History of Tripoli* (1835) and a *History of Oregon and California* (1846), an authoritative work, and his most solid achievement.

GREEN ISLAND. A village in Albany Co., N. Y., situated on an island in the Hudson River, 6 miles from Albany, on the Delaware and Hudson and the New York Central and Hudson River railroads. It is connected by bridges with Troy and Watervliet and has shops of the Delaware and Hudson Canal Company's Railroad. The chief manufactures are iron, lumber, and machinery. Pop., 1900, 4770; 1910, 4737.

GREEN'LAND. The largest island in the world after the island continent Australia. Its area is estimated to be 826,000 square miles. The island is more than 1400 miles in length and, at its broadest part, 690 miles in width. In the extreme south it barely extends below the parallel 60° N.; the most northern point is in 83° 39′. Forming the extreme eastern portion of the American Arctic area, Greenland extends north and south between the Arctic and the Atlantic oceans. On the east it fronts the Arctic Ocean, and on the west it is separated from the American Arctic Archipelago by the broad areas of Davis Strait and Baffin Bay, and by the narrow waterways of Smith Sound, Kane Basin, Kennedy and Robeson channels. The outlines of Greenland have been completed within recent years—on its west coast by Inglefield to 78° 28′ N., by Kane to 80° 10′ N., by Hall to 82° 07′ N., by Nares to 82° 20′ N., by Greely to 83° 24′ N., by Peary to its extremity, 83° 39′ N.; on the east coast by Koldewey to 77° 01′ N., by Duke of Orléans to 78° 16′ N., by Mylius-Erichsen to 80° 04′ N., and by Koch to 83° 30′ N. Bordered by abrupt rocky coasts, rising hundreds of feet out of the very ocean, Greenland is an immense plateau of an average elevation of 4500 feet; the highest ice crossed by Koch was 9000 feet, but a few rounded mountains exceed 10,000 feet. The continuity of the coast line is broken by innumerable penetrating fiords, often scores of miles inland. The characteristic feature of Greenland is its *inland ice*, the most remarkable existent example in the Northern Hemisphere of ice-age conditions. The inland ice covers 712,750 square miles, 86.3 per cent of the entire area of the island. In this vast territory the ice attains a maximum thickness of 2000 feet or more, and only occasional peaks, called nunataks, rise above the ice plain. The only ice-free areas are along the coasts, the widest strip being in the Holstenborg District, west coast, 100 miles, whence it diminishes both north and south to a vanishing point. On the east coast the free land is narrower and for scores of successive miles the open sea breaks against high glacial cliffs. The vast ice sheet moves steadily seaward along lines of least resistance, and many fiords discharge their glacial ice streams at rates reaching from 50 to 100 feet per day. The glacial phenomena present endless varieties of action, which are magnificent in form and incalculable in power and extent. Large lakes, impassable rivers, plunging cataracts, and unfathomable abysses are summer phases of the inland ice in South Greenland. The immensity of action may be surmised from Helland's investigations of Jakobshavn ice fiord, which, from its sea front of 3 miles, discharges from 80,000 to 160,000 cubic meters per day; there was noted an iceberg 369 feet high. The glaciers discharging into the sea probably exceed 1000 in number. Garde in one journey along the southeast coast discovered 200, and of these 70 were a mile or more wide at the sea. In Scoresby Sound were seen two detached bergs, each consisting of about 500,000 cubic meters of ice. The Humboldt and Jokel Bay glaciers are the most stupendous, their discharging sea fronts exceeding 50 miles in length.

The climate is very cold, the mean annual isotherm of freezing temperature crossing the island near its southern end. This fact does not prevent the prevalence of warmth suitable for vegetation during the long summer day, in the interior of the fiords and in sheltered places quite to the northern end of the island. Thus the summer temperature in favored localities often reaches an important height. The mean temperature of the three summer months at Julianehaab, in South Greenland, is 48° F.; at Upernivik, farther north, it is 38° F. As the sun is totally absent from one to five months during the winter from Upernivik to the extreme northern coast, the sunless periods are most bitterly cold in contrast with the Cape Farewell region, where the winters are rainy but relatively warm. Oceanic conditions somewhat affect the east coast, tending to raise the winter and lower the summer temperatures. The following temperatures of selected stations show extremes naturally expected from a region stretching through 24° of latitude. The means are for February and July respectively, in degrees F., followed by the number of days in the year when freezing temperatures occur: West coast, Ivigtut, 61° N. lat., 20.0, 49.3, and 206 days; Godthaab, 64° N., 13.5, 43.7, and 243; Jakobshavn, 69° N., 0.4, 45.9, and 261; Upernivik, 73° N., 10.3, 41.0, and 293; Van Rensselaer Harbor, 79° N. (*March*), 34.9, 38.2, and ?; Thank God Harbor (interpolated from Lady Franklin Bay, opposite), 82° N., 41.7, 37.0, and 314. East coast, Angmagsalik, 66° N., 12.6, 43.7, and 266; Denmark Harbor, 77° N., 17.3, 39.9, and 331 days. April and August bring the largest precipitation, and the climate of the northern part of the island is drier than that of the south. From the recent extended geological investigations in Greenland, summarized by O. Nordenskjöld, it appears that the island consists of a central mass of Archæan rocks, from which portions of the coasts have been lowered through faults. The shores show sedimentary and volcanic belts, the sedimentary rocks there belonging to several paleozoic horizons and to the older Trias; they include igneous rocks similar to those of western Europe and indicate the previous geographical connection of eastern Greenland with Spitzbergen. It is thought that the central plateau of the island was existent when a Mesozoic series, including Rhætic and Jurassic, were deposited. Some Cainozoic rocks are possibly the northwestern margin of the volcanic area of Scotland. Jurassic, Cretaceous, and Tertiary fossils have been found on the east coast, Tertiary and Quaternary fossils on the west coast. Lignite coal is found in many places, the largest areas being in Godhavn District. Twenty different minerals are found on the island. Copper has been lately discovered, but not yet exploited. Greenland is the only country yielding cryolite in commercial quantities, the mines being situated at Ivigtut on the southwest coast. Iron ore is found, and the largest-known meteorites were brought by Peary from near Cape York to the American Museum of Natural History in New York City. Graphite is also found, but not in quantity nor quality suitable for commercial purposes.

Large tracts in the south coast lands and considerable areas in the north are clad in a mantle of mosses, grasses, shrubs, and flowering plants. Most of the shrubs are trailing plants, and few trees grow to a height of over 6 feet. The flora, which includes about 400 flowering plants and some hundreds of lichens, greatly resembles that of Scandinavia. Numerous edible berries (juniper, alder berries, and others) form a small part of the food resources of the southern natives; and the white agents of the Danish government have garden patches in which turnips, cabbage, and lettuce are grown. The fauna is distinctly Arctic. Among the mammals the musk ox (found only to the north of the permanent ice cap) is alone of American origin, the white bear, Arctic fox and hare, ermine, and lemming being European. Wolves, foxes, and hares thrive on the edge of the Arctic Ocean. Flies, mosquitoes, beetles, butterflies, and mollusks abound everywhere along the coast, and no part of the ice-free areas is devoid of animal life. Reindeer are much less numerous than formerly. The little auk, eider duck, and swan have also been greatly depleted. There are about 125 varieties of birds, many of which swarm in enormous numbers on the precipitous mountain sides. In the southern inspectorate the Danes have introduced a few goats and horned cattle. The neighboring waters are rich in food for many varieties of sea animal life. The seal is the largest food resource of the natives, the walrus being next in importance. Walrus ivory and hides are important articles of export.

Industries and Commerce. The industries of Greenland are principally confined to fishing and hunting, and are almost exclusively in the hands of the natives. The unfavorable climatic conditions make agriculture, except a little gardening, impossible, and some of the necessaries and all of the luxuries of life are imported from Denmark. The chief products of the Danish colony are seal and fish oils, skins, and cryolite. A Pennsylvania company has the exclusive privilege of mining and exporting cryolite to the Americas, most of the output going to Philadelphia, though a little is sent to Copenhagen. The product is from 6000 to 12,000 tons a year. The value of the imports of the United States from Greenland in the fiscal year 1914 was $40,920. Commerce is a government monopoly and is under the control of a separate department at Copenhagen. The prices paid to the natives for their products are below their market value, a circumstance which is mitigated by the fact that the government sells the necessaries of life at cost prices. The trade is carried on chiefly by barter, and commodities are supplied by the government stores, which are found in every settlement. The exports and imports amounted to $475,000 and $205,000 respectively in 1912.

Government. The area embraced in the Danish colony is 46,740 square miles on the southwest coast and Angmagsalik on the east coast, the whole including about one-twentieth of the area of the island. In order to protect the natives against destructive exploitation, Denmark established in 1774 a Royal Trade Monopoly. The administration is in the hands of the Greenland Commission at Copenhagen, whose head is a director, appointed by the crown. In his turn he appoints the two inspectors for the administration of the inspectorates of North and South Greenland into which Danish Greenland is divided. The inspectorates are divided into 12 districts, of which Christianshaab, Jakobshavn, Godhavn, Ritenbenk, Umanak, Egedesminde, and Upernivik are in the northern, and Holstenborg, Sukkertoppen Godthaab, Frederikshaab, and Julianehaab are in the southern inspectorate. The district administrators are appointed by the director of the commission and have councils for the regulation of local affairs. The religious and educational training of the natives is most efficiently conducted by government missionaries and teachers appointed by the Minister of Public Works in Denmark. The beneficial effects of the Danish administration are a credit to the nation. The capital of North Greenland is Godhavn, on Disco Island, the most important settlement of the colony, and that of South Greenland, Godthaab.

Population. The population of Danish Greenland in 1911 numbered 13,459, including 384 Europeans. The population has steadily increased, numbering 9588 in 1870 and 11,893 in 1901. There is a considerable admixture of European blood among the natives of West Greenland, but none among those of the east coast. Christianity is professed by all the population of Southwest Greenland, but many of the native customs and superstitions still exist. For further facts relating to these natives and the Eskimo of other parts of Greenland, see Eskimo. For the exploration of Greenland, see Polar Research.

History. The Norseman, Erik the Red, voyaged along the coasts about 984 and gave the country its name. Soon thereafter a settlement was made under his leadership; then Christianity was introduced. Early in the twelfth century a bishopric was founded in the country by the aid of the King of Norway. It was from Greenland that Leif Ericson set forth upon the voyage in the course of which he is supposed to have reached America. The population centred in two districts on the west coast, Western Bygd and Eastern Bygd. Greenland was at first an independent state with a constitution and in most respects followed in Iceland's course of development. About 1260 it was constituted a territory of Norway and thus came into the union of Sweden and Denmark at the close of the fourteenth century. In 1410 voyages ceased to Norway, and, as a result, Greenland became lost to the world and remained practically a blank in history until 1576. Expeditions sent out by Denmark after 1579 to redeem the colony accomplished nothing. About that epoch, however, English explorers—Frobisher, Davis, Hudson, and others—discovered various portions of the coast. In 1616 Baffin, crossing Melville Bay, discovered and named Smith Sound, attaining a latitude that was unsurpassed for 245 years.

In 1721 a Norwegian missionary, Hans Egede, with the support of the Danish government, made a settlement at Godthaab on the west coast and introduced Christianity anew among the Eskimo. During the eighteenth and nineteenth centuries the Danes acquired control of that uninhabited portion of Greenland which extends from Angmagsalik on the east coast round Cape Farewell to Tessuisak on the west coast. The region above Melville Bay was visited by John Ross in 1818 and by Inglefield in 1852; but the geographical knowledge concerning this region is mainly due to Americans—Kane, Hayes, Hall, Greely, and Peary. One English expedition has passed beyond Cape York since the days of Inglefield—the British Admiralty expedition under Nares in 1875–76. Kane Basin and Kennedy Channel were first explored by Kane and Hayes, and the knowledge of the straits and bays above them as far as the Arctic Ocean is due to Hall. Nares's expedition traced the northwest coast of Greenland as far as Cape Britannia. Lockwood and Brainard, of the Greely expedition, pushed farther along the northwest coast line to 83° 24′. Peary reached the northern end of Greenland in 1901, possibly the most northerly land in the world (83° 39′). The east coast has been examined by various explorers, among them, Scoresby, Graah, and Koldewey. The crossing of the ice cap of Greenland was initiated by Nordenskiöld, the great Arctic explorer, who was only partly successful in 1870 and in 1883. Crossings have been made by five explorers, as follows: Nansen, 1888, from Umivik to Godthaab; Peary, 1892, from Inglefield Gulf to Navy Clif and return, and again by the same route in 1895; Rasmussen, 1912, from Inglefield Gulf to Denmark Fiord, and the same year from Independence Sound to Wolstenholme Sound; De Quervain, 1912, from Angmagsalik to Jakobshavn; and Koch, 1913, from Denmark Harbor to Lakse Fiord, Upernivik. The last journey appears to be the most valuable, as Koch crossed the island at its widest part and traversed ice at an elevation of 9800 feet. Their Danish successors have conducted a series of expeditions which in plan and accomplishment are unsurpassed in Arctic work. They have rectified existing errors, changed entirely the features of previous charts of northeast Greenland, and established the continuity of the island from Cape Farewell to 83° 39′ N. Their scientific and field work appears in the *Meddelelser om Grønland*, as follows: G. Holm, who discovered the Angmagsalik natives, ix–x; Ryder, Scoresby Sound, xvii–xix; Amdrup, Christian IX Land, xxvii–xxx: Mylius-Erichsen and Koch, Northeast Foreland, Denmark Fiord, etc., xli–xlvi.

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GREENLAND DOVE. See GUILLEMOT.

GREENLAND RIGHT WHALE. See WHALE, Plate of WHALES and Colored Plate of MAMMALIA.

GREEN′LEAF, CHARLES RAVENSCROFT (1838–1911). An American physician and soldier, born at Carlisle, Pa. He graduated from the Ohio State Medical College in 1860 and, enlisting in the Civil War as assistant surgeon of the Fifth Ohio Infantry, served on the staffs of Generals McClellan, Lew Wallace, Hancock, Wright, and Thomas. In the regular service he became colonel and assistant surgeon-general in 1896, was retired in 1902, and was made brigadier general in 1904. During the Spanish-American War he served in Cuba and Porto Rico as chief surgeon of the army in the field, and in 1900 he was chief surgeon of the Division of the Philippines on the staffs of Generals Otis and MacArthur. For a time he was professor of public and military hygiene at the University of California. He published *Greenleaf's Manual for Medical Officers; Greenleaf's Epitome of the Examination of Recruits*; "A System of Personal Identification," in Buck's *Handbook*.

GREEN′LEAF, SIMON (1783–1853). An American jurist. He was born in Newburyport, Mass., began the practice of law in Maine in 1806, and on the establishment of its Supreme Court in 1820 became reporter. He was chosen professor of law in Harvard in 1833, but resigned in 1848 and was made professor emeritus. His most important work is *A Treatise on the Law of Evidence* (3 vols., 1842–53; 16th ed., 1899, rev. and enlarged by J. H. Wigmore). He published also: *Origin and Principles of Freemasonry* (1820); *Reports of Cases in the Supreme Court of Maine* (9 vols., 1822–35); *Examination of the Testimony of the Four Evangelists by the Rules of Evidence as Administered in Courts of Justice, with an Account of the Trial of Jesus* (1846).

GREEN′LET. See VIREO.

GREEN LIN′NET. See GREENFINCH.

GREEN′MAN, JESSE MOORE (1867–). An American botanist, brother of Milton Jay Greenman. He was born at North East, Pa., and was educated at the University of Pennsylvania (B.S., 1893), at Harvard University (M.S., 1899), and at the University of Berlin (Ph.D., 1901). After spending three years as an instructor in botany and as an assistant in the Gray Herbarium of Harvard, he became assistant curator of the botanical department of the Field Museum of Natural History, Chicago, in 1905 and also assistant professor of botany at the University of Chicago in 1908. Greenman is regarded as an authority on the flora of Mexico and the western part of the United States. He is author of several studies published by the Field Museum.

GREENMAN, MILTON JAY (1866–). An American anatomist, brother of Jesse Moore Greenman. He was born at North East, Pa., and in 1889 graduated from the University of Pennsylvania (M.D., 1892), where he was instructor in biology in 1889–92 and lecturer on physiology in 1892–93. He was assistant director of the Wistar Institute of Anatomy, Philadelphia, from 1893 to 1905, when he became director. His investigations deal with the placentation of mammals and the regeneration of peripheral nerves.

GREEN MANURING. The very old and widely employed practice of growing crops to improve the soil by plowing them under, usually while green. The value of the practice was well understood by the Romans, as is shown by the writings of Varro, Vergil, and others. It is especially suited to temperate regions and light, poor soils. Two classes of plants are used for green manuring—those that are capable of thriving in the surface soil on a limited supply of plant food, which is thus saved from loss by washing or leaching; and those that gather plant food from both the air and the subsoil and are thus able to increase the fertility of the surface soil. To the first class belong rye, buckwheat, rape, etc.; to the second the leguminous plants. The leguminous plants are peculiarly adapted to green manuring because they have the power to assimilate through their root tubercles the free nitrogen of the air and thus enrich the soil by the added stores of this valuable fertilizing constituent. Some of them also send down long roots into the subsoil and draw up supplies of plant food to the surface which would otherwise be unavailable to ordinary crops. Green manures not only increase the available plant food in soils by the stores gathered from the air and the subsoil, but by their decomposition they set free plant food already in the soil, and which would otherwise be unavailable. They also improve the physical properties of the soil by the humus they form when they decay. Among the most important leguminous green-manuring crops are red clover, crimson clover, cowpeas, vetches, and soy beans; but there are many others which are specially adapted to the purpose in particular regions. Liming is generally, and inoculation of the soil with root-tubercle organisms is often, necessary for the most successful culture of leguminous green-manuring crops. Serradella and lupines are, however, examples of such crops which grow well on soils deficient in lime. Green manures, as a rule, give the best results when followed by cultivated crops. In any case the green manure should be given time to decompose thoroughly in the soil before the succeeding crop is planted. Green manuring will usually be found unnecessary in a rotation including a leguminous crop. Where live stock is kept, it is usually considered better practice to feed the crops to the animals and return the manure to the land than to turn them under as green manure. See also MANURES AND MANURING; SOIL; CLOVER.

GREEN MONKEY. A West African monkey (*Cercopithecus*, or *Lasiopyga, callitrichus*). It is one of the guenons, closely allied to the grivet, and about the size of a cat. As it is numerous in its native forests and is hardy in other climates, it is to be seen in most menageries; but its tendency is to grow vicious with age. One of its peculiarities is its complete silence. In color it has a greenish hue above, though the hairs are really tinted with a mixture of black and yellow. The extremities are darker, and the whiskers and undersurface are yellowish, inclining in some individuals to decided orange color. Cf. GRIVET; VERVET; GUENON.

GREEN MOUNTAIN BOYS. The name given to the soldiers of Vermont in the Revolution, originally organized in 1775 by Ethan Allen (q.v.) to oppose the claims of New York State to the Vermont territory. The band held the Canadian passes against the British during the Revolution.

GREEN MOUNTAINS. The northernmost extension of the Appalachian system, spreading over a large part of Vermont and extending northward towards the Gulf of St. Lawrence, and southward under the names of the Hoosac Mountains, Berkshire Hills, and Taconic Mountains (a distinct range) into western Massachusetts, Connecticut, and New York (Map: Vermont, C 4). Within the State of Vermont they are but little broken, from the Massachusetts line northward to the deep valleys of the Winooski and Lamoille rivers. The ridge line is usually more than 2000 feet above sea level, and considerable reaches are above 2500 feet. The Green Mountains reach their greatest elevation in the northern and central parts of Vermont, the highest peak being Mount Mansfield, 4364 feet above sea level; other important peaks are: Killington, 4241; Camel's Hump, 4088; Lincoln, 4078; and Jay, 4018 feet. Where the range is unbroken, it forms a continuous watershed for the streams running into the Connecticut River on the east and the Hudson and Lake Champlain on the west. Geologically they are mainly of primitive structure, consisting of granite, gneiss, etc., with a layer of old red sandstone on the western slope. The hills and even the highest peaks have a smooth and rounded surface, and their ascent is easy; the summits are covered with grass, and on the slopes are large forests of pine, hemlock, spruce, etc., as well as hardwood forests on the better lands. The soil is not well adapted for agriculture, but the pasturage is fine, and the streams give abundant water power. The range contains valuable mineral deposits, including marble, iron, and manganese, slate, and some copper.

GREEN MOUNTAIN STATE. Vermont. See STATES, POPULAR NAMES OF.

GREENOCK, grēn′ok. An important seaport and manufacturing town in Renfrewshire, Scotland, on the left bank of the Firth of Clyde, 22 miles west-northwest of Glasgow (Map: Scotland, D 4). Its chief industries are shipbuilding, dating from 1760; sugar refining, since 1765; the manufacturing of steam engines, ironwork, chain cables, anchors, ropes, sails, paper, woolen goods, etc. Fisheries employ a large number of boats. Its harbor works, commenced in 1707, comprise six tidal basins, a wet dock, and five dry docks; at the "Tail of the Bank," part of a large sand bank lying off the town, it possesses the best anchorage in the Clyde. Trade is carried on with Ireland, North America, and the West and East Indies. In 1912 vessels representing a total tonnage of 2,249,058 tons entered and cleared in foreign and colonial trade. The value of its imports and exports amounted to about $14,512,000. The town is built irregularly and extends for 4 miles along the shore and on the slopes of the adjacent hills. The central busy portion has overcrowded, narrow streets and lanes, but the west end has wide, well-paved streets, planted with trees, handsome residences, and an esplanade 1½ miles long. The Watt Institute was erected in memory of James Watt (q.v.), who was born at Greenock. In the graveyard of the parish church, a late Gothic edifice, Burns's "Highland Mary" lies buried. The town owns its water works, and its water power is extensively used in the factories. It also owns its harbors, gas, electric-lighting plant, tramways, artisans' dwellings, and cemeteries. It is the seat of an American consular agent. Greenock owes its growth and prosperity to the Shaw family and to the Union of 1707, which facilitated foreign trade. Pop., 1911, 75,303. Consult Campbell, *Historical Sketches of the Town and Harbors of Greenock* (Glasgow, 1879–81).

GREEN′OCKITE. A cadmium sulphide crystallizing in the hexagonal system, but commonly occurring in yellow coatings on sphalerite (q.v.), with which it is usually associated. Greenockite is found in Renfrewshire, Scotland; Pribram, Bohemia; and in Pennsylvania, Missouri, and Arkansas.

GREENOUGH, grēn′ō, GEORGE BELLAS (1778–1855). A British geologist, born in London. He was educated at St. Peter's College, Cambridge, at Göttingen, and at Freiburg under Werner. In 1807 he was elected a fellow of the Royal Society; and he was one of the founders of the Geological Society of London in 1807, its first president, after it was regularly organized, from 1811 to 1817, and president again in 1818 and 1833. From 1807 to 1812 he was a member of Parliament for the borough of Gatton. He published: *A Critical Examination of the First Principles of Geology* (1819), which consisted of eight lectures and was translated into French, German, and Italian; his noteworthy *Geological Map of England and Wales* (1819; 2d ed., 1839) in six sheets; and a geological map of India (1854).

GREENOUGH, HORATIO (1805–52). The first eminent American sculptor. He was born in Boston, Sept. 6, 1805, the son of a well-to-do merchant of Boston, and received his earliest training in art from carvers and modelers there, especially from a French sculptor named Binon, who modeled the bust of John Adams in Faneuil Hall. At the age of 16 he entered Harvard College, from which he graduated in 1825. While at Harvard he met Washington Allston, his lifelong friend and mentor, who inspired him and assisted in arranging his plans for study. At Harvard, also, he made a thorough study of anatomy. The most important works of this early period were a bust of Washington, modeled from Stuart's portrait, and the original design for Bunker Hill Monument. After graduation Greenough went to Rome, where his real study of art began under Thorvaldsen. His earliest works at Rome were a series of busts and the statue of "Abel"; but before the end of the first year an attack of malaria caused his return to Boston. Proceeding to Washington, he modeled the busts of President J. Q. Adams and Chief Justice Marshall, returning to Italy in 1827. After studying the finishing of sculpture at Carrara, he established a studio at Florence. He was much encouraged by Fenimore Cooper, who gave him a commission for the "Chanting Cherubs," the nudity of which caused much discussion. Through his efforts the young sculptor also received from the United States government the commission for his greatest work, the colossal statue of Washington (1843), conceived as the Olympian Zeus. Originally intended to be placed under the dome of the Capitol, it was found too heavy for that position; but until recently, when it was relegated to a sheltered place in the Smithsonian Institution, it occupied a prominent place on the avenue leading to the east front of the Capitol. Although long the butt of ignorant ridicule, it excelled every public American monument of its day in purity of taste and loftiness of conception. On the projecting buttress of the same east front is his large group of "The Rescue" (1837–57), typifying civilization—the first large group carved by an American. He returned in 1851 to Boston, where he died December 13 of the following year.

Greenough was the first professional American sculptor, more than any other the founder of the American school. He was, besides, a man of wide culture and refinement, the intimate friend of Emerson, and a profound thinker. His art was in the classical manner of his day, without personality or emotion. In the public collections of the United States, Greenough is represented in the Boston Museum by "Angel and Child," a bust of Napoleon, "Cupid Bound," a portrait bust of Hamilton, a relief of "Castor and Pollux"; in the Boston Athenæum by "Venus Victrix"; in the Pennsylvania Academy (Philadelphia) by the well-known bust of Lafayette; in the New York Historical Society by the bust of John Quincy Adams; in the Art Institute of Chicago by the "Angel Abdiel." Among other well-known busts are those of John Adams, Henry Clay, Josiah Quincy, Samuel Appleton, Jonathan Mason, John Jacob Astor, etc. Consult: Dunlap, *History of the Rise and Progress of the Arts of Design in the United States* (New York, 1834), in which interesting letters by the artist and his brother are published; Tuckerman, *A Memorial of Horatio Greenough* (ib., 1853); Taft, *History of American Sculpture* (ib., 1903).

GREENOUGH, James Bradstreet (1833–1901). An American classical scholar, born at Portland, Me. He graduated from Harvard College in 1856. After practicing law for a few years in Michigan, he accepted an appointment in 1865 as tutor in Latin in Harvard College. In 1873 he was appointed assistant professor, and in 1883 professor, of Latin—a position which he continued to hold until a few months before his death, when failing health forced him to resign. Professor Greenough is best known as editor of a series of Latin textbooks for schools, called the "Allen and Greenough Series," which have passed through many editions, and as the author, in conjunction with J. H. Allen, of a *Latin Grammar*, which is widely used (1872; latest ed., 1903). He was the first to offer instruction in Sanskrit and comparative philology in Harvard College in 1872 and continued to teach these subjects in connection with his regular work in Latin until 1880, when an independent chair of Sanskrit was founded. He also was a prime mover in organizing the Society for the Collegiate Instruction of Women, from which Radcliffe College was developed, and was the first chairman of its academic board. He was joint author with Prof. George Lyman Kittredge of *Words and their Ways in English Speech* (1901), an excellent work. He contributed also to *Harvard Studies* papers on Latin syntax and etymology. Besides his more serious work, he wrote many graceful verses in both English and Latin. For an account of his life and writings, consult Kittredge, in *Harvard Studies*, xiv (Cambridge, 1903).

GREEN'PORT. A village in Suffolk Co., N. Y., opposite Shelter Island, in Gardiner's Bay, with which it is connected by steam ferry, 94 miles east by north of New York City, on the Long Island Railroad (Map: New York, C 2). It is a popular summer resort and has a fine landlocked harbor, accessible for the largest ships, and oyster, fishing, farming, and boatbuilding interests. Greenport contains a high school and the Eastern Long Island Hospital. The water works and electric-light plant are owned and operated by the municipality. Greenport was settled in 1831 and was incorporated in 1868. Pop., 1900, 2366; 1910, 3089.

GREEN RIVER. One of the head streams of the Colorado River (q.v.). It rises in the Wind River Range, in northwestern Wyoming, flows southward through the Green River basin, the Uinta Mountains, and through a series of cañons to its confluence with the Grand River (q.v.) in southeastern Utah, to form the Colorado (Map: Utah, D 3). Its length is about 700 miles. By way of this river Major Powell and others have made perilous trips into the Grand Cañon of the Colorado.

GREEN RIVER. A large tributary of the Ohio. It rises in Lincoln County, near the centre of the State of Kentucky, flows in a generally westward, then northwestward, direction, joining the Ohio about 8 miles above Evansville, Ind. (Map: Kentucky, C 4). Its length is about 300 miles, and it is 200 yards wide at its mouth; locks and dams make it navigable for small steamers for 200 miles. It passes within ¼ of a mile of the mouth of the Mammoth Cave, and it has a subterranean affluent in the Echo River of the cave.

GREEN'ROOM. In the theatre, a room, usually at the side of the stage, where actors wait during the intervals of their parts in the play, and from which the dressing rooms lead. It also serves as a reception room (in French, the *foyer des artistes*) where actors meet friends and callers at the close of the play. The name is derived from the hangings and furnishings, which at an earlier period were uniformly green. No such uniformity prevails at the present day, and many greenrooms are very meagrely furnished.

GREENS. A common name for any green herbage boiled as a vegetable for the table. Spinach, young beet tops, dandelion leaves, kale, and mustard are the principal plants used for this purpose, though in early spring, when the appetite craves something green, the foliage of many other plants is used. The culture of the above plants is noted under their names.

GREEN'SAND'. A name given to greenish, clayey, or sandy deposits of which the mineral glauconite (a hydrated silicate of potassium and iron) is the predominant constituent, but which contain particles of other minerals, such as quartz, feldspar, hornblende, pyroxene, and garnet. Greensand occurs in formations as old as the Cambrian, but it is most abundant in Cretaceous strata. In the Atlantic coast region the deposits are distributed over wide areas and in places attain considerable thickness. Here three beds have been recognized, known as the Upper, Middle, and Lower Greensand, all of Cretaceous age. In Europe the deposits occurring in the Cretaceous are divided into the Upper and Lower Greensand. The Upper Greensand consists of beds of sand, generally green in color, with included masses of calcareous grit called firestone. The strata on the cliffs of the Isle of Wight are 100 feet thick. The Lower Greensand is made up of indurated sandstones and clays, with occasional calcareous beds, and has a thickness of 800 or 900 feet. Between the two formations is the series of strata known as the Gault. See CRETACEOUS SYSTEM.

GREENSBORO, grēnz′bŭr-ŭ. A city and the county seat of Hale Co., Ala., 100 miles west by north of Montgomery, on the Southern Railroad (Map: Alabama, B 3). It is the seat of the Southern University (Methodist Episcopal, South), opened in 1859, and of the Greensboro Female Academy. The most important industries are farming and cotton growing. Greensboro, first settled in 1816, is governed under a charter of 1898, which provides for a mayor, chosen biennially, and a council, elected on a general ticket. The city is in the heart of the famous "black belt" of Alabama. Pop., 1900, 2416; 1910, 2048.

GREENSBORO. A city and the county seat of Greene Co., Ga., 88 miles by rail east-southeast of Atlanta, on the Georgia Railroad (Map: Georgia, C 2). It is surrounded by an agricultural and dairying region, and has a cotton mill, a cottonseed-oil mill, a cotton ginnery, fertilizer factory, and a creamery. The water works and electric-light plant are owned by the city. Pop., 1900, 1511; 1910, 2120.

GREENSBORO. A city and the county seat of Guilford Co., N. C., 81 miles west by north of Raleigh, on the Southern Railroad (Map: North Carolina, C 1). It is the seat of the Greensboro Female College (Methodist Episcopal, South), opened in 1846, the State Normal and Industrial College for white women, the State Agricultural and Mechanical College for colored students, and the Bennett and Lutheran colleges for negroes; and it contains also a Masonic Home, public library, several hospitals, and Fisher and Lindley parks. The city carries on a considerable trade in tobacco, cotton, coal, and iron, and manufactures spokes and handles, bent rims, bobbins, cotton-mill supplies, cotton goods, flannels, carpets, saw-mill machinery, furniture, fertilizers, stoves, sewer and drain pipe, buggies, cigars, flour, brick, tile, etc. Greensboro adopted the commission form of government in 1911. The city owns and operates its water works. Greensboro was settled in 1808 and received its first charter in 1870. The battle of Guilford Court House (q.v.) was fought, March 15, 1781, 5 miles northwest of Greensboro. Pop., 1890, 3317; 1900, 10,035; 1910, 15,895; 1914 (U. S. est.), 18,391.

GREENS′BURG. A city and the county seat of Decatur Co., Ind., 47 miles southeast of Indianapolis, on the Cleveland, Cincinnati, Chicago, and St. Louis Railroad (Map: Indiana, G 6). It is the centre of a fertile agricultural region, has an abundant supply of natural gas, and there are limestone quarries, flour mills, and a brush and wire factory. The city has a beautiful park, a Carnegie library, and the State Odd Fellows' Home. The government is administered by a mayor, chosen every four years, and a unicameral council. Pop., 1900, 5034; 1910, 5420.

GREENSBURG. A borough and the county seat of Westmoreland Co., Pa., 31 miles by rail east by south of Pittsburgh, on the Pennsylvania Railroad (Map: Pennsylvania, C 7). It has an extensive trade in coal which is mined in the vicinity and manufactures glass, iron, and brass goods, engines, nuts and bolts, lumber, bricks, flour, etc. The borough contains St. Joseph's Academy for young women (Catholic), and several other private institutions for secondary education. Near Greensburg stood the village of Hanna's Town, which was destroyed by the Indians in July, 1782, and in which, it is said, was held in 1773 the first regularly constituted court of justice west of the Alleghany Mountains. Pop., 1900, 6508; 1910, 13,012.

GREEN′SHANKS′. A widely distributed "tell-tale" sandpiper (*Tringa nebularia*) of the Old World, which visits Great Britain and southern Europe in winter and offers sport for gunners during its migrations. It is related to, and is about the size of, the American yellowlegs, but differs in coloration. The plumage is mostly dusky brown on the upper parts, the feathers edged with yellowish white; the under parts are white, and the legs dull olive, "green" only by contrast with the pinkish tint of those of the redshanks (q.v.). It is graceful in flight and adds interesting traits of its own to the general behavior of its race. It breeds in northern Scotland, in Scandinavia, and Siberia; and in winter many go to South Africa and even to Australia. The green sandpiper of England is a quite different bird (*Tringa ocrophus*).

GREEN SICKNESS. See CHLOROSIS; ANÆMIA.

GREEN′SLEEVES′. An old English ballad, first printed in 1580 as "A New Northern Dittye of the Lady Greene Sleeves," though the ballad was popular before that time. It appeared in *A Handefull of Pleasant Delites*, 1584, as "A New Courtly Sonet of the Lady Greensleeves, to the new tune of Greensleeves." The lively tune, the air of "Christmas comes but once a year," has been popular since the time of Elizabeth. Shakespeare mentions it twice in *The Merry Wives of Windsor*. The words are found in Child's *English and Scottish Ballads*, and the tune in Chappell's *Old English Popular Music* (1893).

GREENS′LET, FERRIS (1875–). An American editor and writer, born at Glens Falls, N. Y. He graduated from Wesleyan University, Conn., in 1897, and from Columbia University (Ph.D.) in 1900. He was associate editor of the *Atlantic Monthly* in 1902–07 and became literary adviser in 1907 and director in 1910 of the Houghton Mifflin Co., publishers. He is author of *Joseph Glanvill—A Study in English Thought and Letters of the Seventeenth Century* (1900); *The Quest of the Holy Grail* (1902); *Walter Pater* (1903, 1911); *James Russell Lowell: His Life and Work* (1905); *Life of Thomas Bailey Aldrich* (1908).

GREEN SNAKE. A name given to several serpents prevailingly green and including some poisonous Oriental species. The green snake of the United States, however, is a harmless and beautiful colubrine (*Liopeltis vernalis*). It is small, extremely slender, and in color grass green above, lighter on the sides, and yellowish white beneath. It feeds upon insects, is agile in climbing, and often festoons itself upon the branches of a bush, where it is almost invisible among the leaves.

GREENS'POND. A port of entry on a barren island of the same name in the north of Bonavista Bay, on the east coast of Newfoundland (Map: Newfoundland, G 3). It has a safe harbor and is an important sealing station. Pop., 1901, 1358; 1911, 1304.

GREEN'STONE'. A term loosely applied to rocks of basic composition which have a greenish color due to the abundance of the hornblende which they contain. Most greenstones are diorite (q.v.) or altered diabase. The term "greenstone" is obsolescent and is used chiefly to describe collectively rocks which have not been carefully studied.

GREEN'S TU QUOQUE (tū kwō'kwē), **OR THE CITIE GALLANT.** An extremely clever comedy, by John Cooke (1614). The name was due to the comedian Green, who took the part of Bubble.

GREEN STURGEON. See STURGEON.

GREEN THURSDAY (Lat. *dies viridium*). The Thursday preceding Good Friday, called also Maundy Thursday. The name first came into use about 1200, and its origin is variously referred to the Twenty-third Psalm, the usual selection for the day, and to the custom of partaking of spring herbs on that day. Green Thursday was made a Christian feast day towards the end of the seventh century to commemorate the institution of the Lord's Supper.

GREEN TURTLE. A large, vegetable-feeding marine turtle (*Chelonia mydas*), which occasionally makes its way as far north as Long Island Sound. It feeds on the eelgrass (*Zostera*). This is the turtle of turtle-soup fame and may attain a weight of 350 pounds. The flesh of the Pacific form, at proper seasons, is said to be superior to that of the Atlantic species. The eggs are prized for food. They are buried in the sand along the shores of the islands of the south Atlantic. The turtles are captured while ashore at night laying the eggs, or more often are taken in nets, and sometimes they are speared when swimming, and are transported alive to the Northern markets. See TURTLE.

GREE'NUK. See GAZELLE.

GREEN'UP, ALBERT WILLIAM (c.1868–). An English biblical scholar. He was born at Ryde, Isle of Wight, was educated at St. John's College, Cambridge (B.A., 1890; M.A., 1893), was rector of Alburgh in 1897–99, and in 1900 became a member of the faculty of theology of the University of London, of which he was dean in 1908–12. He was then appointed principal of the London College of Divinity, St. John's Hall, Highbury. His most valuable published works are texts, in some cases previously unedited, of commentaries (Midrash, especially Yalqut Machiri) on different Old Testament books.

GREEN VAULT (Ger. *Grünes Gewölbe*). A section of the Royal Palace at Dresden, so called from the color of the walls of one of its apartments.

GREEN'VILLE. A city and the county seat of Butler Co., Ala., 44 miles southwest of Montgomery, on the Louisville and Nashville Railroad (Map: Alabama, C 4). It has cotton gins, an oil mill, a fertilizer factory, lumber mills, and a red-cedar factory, and is a market of considerable importance for lumber and cotton. The city owns the water works. Pop., 1900, 3162; 1910, 3777.

GREENVILLE. A city and the county seat of Bond Co., Ill., 51 miles east by north of St. Louis, Mo., on the Vandalia Railroad (Map: Illinois, F 8). It has a Carnegie library and is the seat of Greenville College (Free Methodist), opened in 1892. The city is the centre of an agricultural and coal-mining region, has flour and lumber mills and a grain elevator, and manufactures bricks, wagons, gloves, condensed milk, lodge paraphernalia, etc. The water works are owned by the city. Pop., 1900, 2504; 1910, 3178.

GREENVILLE. A city in Montcalm Co., Mich., 27 miles (direct) northeast of Grand Rapids, on Flat River, which supplies abundant water power, and on the Père Marquette and the Grand Trunk railroads (Map: Michigan, D 5). It has manufactures of flour, refrigerators, lumber products, furniture, kitchen cabinets, stove fixtures, motor boats, gas engines, agricultural implements, etc., and is an important market for agricultural produce, particularly potatoes and beans. The water works are owned by the municipality. Pop., 1900, 3381; 1910, 4045.

GREENVILLE. A city and the county seat of Washington Co., Miss., on the Mississippi River, about 137 miles south by west of Memphis, Tenn., on the Yazoo and Mississippi Valley and the Southern in Mississippi railroads (Map: Mississippi, C 4). It has steamboat connection with various river ports, an extensive trade in cotton, being the centre of a remarkably productive cotton-growing region, and several cottonseed-oil mills, large cotton compresses, lumber mills, etc. There are public parks and playgrounds, a public library, sanitarium, and the King's Daughters Home. The city owns its water works and sewage system. Pop., 1900, 7642; 1910, 9610; 1914 (U. S. est.), 10,448.

GREENVILLE. A town and the county seat of Pitt Co., N. C., about 100 miles northwest of Raleigh, on the Tar River, and on the Norfolk Southern and the Atlantic Coast railroads (Map: North Carolina, E 2). It is the seat of the East Carolina Teachers' Training School. It is the distributing centre for a tobacco, cotton, and corn region, and there are tobacco factories, cotton, veneer, and oil mills, and a buggy factory. Greenville owns its water works and electric-light plant. Pop., 1900, 2565; 1910, 4101.

GREENVILLE. A city and the county seat of Darke Co., Ohio, on Greenville Creek, 35 miles northwest of Dayton, on the Dayton and Union, the Cincinnati Northern, the Ohio Electric, and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads (Map: Ohio, A 5). It has a considerable trade in lumber and tobacco, and there are 12 large tobacco warehouses. Other industrial establishments include a foundry and machine shops, lumber mills, glove works, fence works, underwear and incubator factories, and a creamery. The surrounding country is agricultural. There are a Carnegie library, a fine courthouse, an infirmary, and a children's home. The government, under the municipal code of 1902, is vested in a mayor, elected biennially, and a council. The city owns and operates its water works. Greenville is on the site of Fort

Greenville, built by General Wayne in December, 1793, where he remained with his army until July, 1794. After the battle of Fallen Timbers in 1794, General Wayne spent the winter of 1794–95 here, and on Aug. 3, 1795, concluded his famous treaty with the Indians. Greenville was first incorporated in 1832. Pop., 1900, 5501; 1910, 6237.

GREENVILLE. A borough in Mercer Co., Pa., on the Shenango River, 85 miles north by west of Pittsburgh, on the Pennsylvania, the Erie, and the Bessemer and Lake Erie railroads (Map: Pennsylvania, A 3). It is the seat of Thiel College (Lutheran), opened in 1870. The manufacturing interests include railroad shops, bridge works, gristmills, a cement-block plant, an automobile factory, foundries and machine shops, saw and planing mills, steelworks, and flour mills. Good water power is derived from the Shenango River. Pop., 1900, 4814; 1910, 5909.

GREENVILLE. A city and the county seat of Greenville Co., S. C., 160 miles northeast of Atlanta, Ga., on the Southern, the Greenville and Knoxville, the Piedmont and Northern, and the Charleston and West Carolina railroads (Map: South Carolina, B 2). It is noted as an educational centre; among its institutions are Furman University (Baptist), opened in 1851; Greenville Female College (Baptist), opened in 1854; Ursuline Academy, founded in 1900; and Chicora College (Presbyterian) for women, opened in 1893. The city has numerous industrial establishments, including cotton mills, foundries, carriage and wagon works, bagging factories, a bleachery, an underwear factory, and smaller plants. Settled in 1776, Greenville was incorporated in 1831. The government is administered under a charter of 1902 by a mayor, chosen biennially, who appoints the board of health; police commission, elected by the people; and a unicameral council, which elects the clerk, treasurer, chief of fire department, and sextons of cemeteries. Pop., 1900, 11,860; 1910, 15,741; 1914 (U. S. est.), 17,395.

GREENVILLE. A city and the county seat of Hunt Co., Tex., 54 miles northeast of Dallas, on the Missouri, Kansas, and Texas, the Texas Midland, and the St. Louis Southwestern railroads (Map: Texas, D 3). It is surrounded by an agricultural region, has a large cotton compress, cottonseed-oil mills, etc., and has an important trade in cotton and cottonseed-oil products. The city is the seat of Burleson College (Baptist), Wesley College (Methodist), and Holiness University, and has two public parks. Settled in 1844, Greenville was incorporated in 1875 and has adopted the commission form of government. The city owns and operates its water works, electric-light plant, and sewer system. Pop., 1900, 6860; 1910, 8850; 1914 (U. S. est.), 9696.

GREEN VIT′RIOL, or COPPERAS. The commercial hydrated ferrous sulphate, which crystallizes in green monoclinic prisms. It is prepared by heating iron wire or ferrous sulphide in a dilute solution of sulphuric acid, filtering the solution, and concentrating the filtrate to crystallization. It is also found native as the mineral melanterite, usually as an efflorescence resulting from the decomposition of pyrite or marcasite. Much copperas is now produced in the "pickling" of ironwares previous to tinning, galvanizing, etc.

GREEN′WALD, EMANUEL (1811–85). An American theologian, born near Frederick, Md. After studying privately and receiving his license from the Lutheran Synod of Maryland in 1831, he settled at New Philadelphia, Ohio, which until 1851 was his headquarters for general work among the scattered Lutherans of the Middle West. He subsequently held pastorates at Columbus, Ohio, Easton, Pa., and Lancaster, Pa. He was the founder and for many years the editor of the *Lutheran Review*, was president of the Pennsylvania Ministerium, the oldest Lutheran Synod in America, from 1873 to 1877, and the next year presided over the Lutheran Diet, assembled in Philadelphia. He died at Lancaster, Pa. His published works include: *The Lutheran Reformation* (1867); *The Foreign Mission Work of Louis Harms* (1868); *Sprinkling the True Mode of Baptism* (1876); *The True Church: Its Way of Justification and its Holy Communion* (1876); and *Romanism and the Reformation* (1880). He also published several books for children.

GREEN′WAY, THOMAS (1838–1909). A Canadian statesman. He was born in Cornwall, England, early went to Upper Canada (Ontario), and became a merchant in Centralia. In 1875–78 he was an Independent member of the House of Commons and after removal to Manitoba was elected (1879) a Liberal member of the Manitoba Legislature. In 1887 he became leader of the Liberal Opposition, and in 1888 Premier. His administration, which was in power until 1900, enacted useful measures to promote public economy and railway building, but excited much opposition by passing laws which abolished French as an official language for the province and did away with separate schools; the aim was to prevent in Manitoba the establishment of French educational and religious rights as they had existed in other provinces of Canada. Greenway died at Ottawa.

GREEN′WEED′. A name given to certain half-shrubby species of *Genista*, a genus of Leguminosæ. Dyers' greenweed (*Genista tinctoria*), also called woadwaxen and whin, a species 1 or 2 feet high, with lanceolate leaves and terminal spiked racemes of pale-yellow flowers, is frequent in woods, meadows, and hilly pastures in most parts of Europe, in the temperate parts of Asia, and in New York and Massachusetts, where it has become established. Its branches, leaves, and flowers—particularly the flowers—yield a fine yellow dye, chiefly used for wool; its flowers mixed with woad yield a fine green dye. Formerly it was in great esteem as a dyestuff, but other substances have now almost entirely supplanted it. The leaves and seeds were also formerly used in medicine; the former as a diuretic, the latter as a mild purgative. Hairy greenweed (*Genista pilosa*), abundant in some parts of Europe, is cultivated, particularly upon light and sandy soils in France, for sheep, which are very fond of it. It is a slender, branched, tortuous, and procumbent plant, with small pale-yellow flowers. Some of the species are used to keep sand from drifting and others for covering rocky and otherwise bare places. See BROOM.

GREEN′WELL, DORA (1821–82). An English writer of religious poetry and prose. She was born and spent her youth in Durham, but lived latterly in London, where her mature poetry was published: *Carmina Crucis* (1869); *Songs of Salvation* (1873); *The Soul's Legend* (1873); and *Camera Obscura* (1876). She was also the author of works of religious edification in prose.

GREENWICH, grĭn′ĭj *or* grĕn′ĭj. A metropolitan borough of London, England, in Kent, a former town on the high bank of the Thames, 5 miles southeast of St. Paul's Cathedral (Map: England, G 5). It is connected with the north bank of the Thames by the Blackwall Tunnel, built in 1897, and the Greenwich Tunnel, built in 1902. It is noted for the Greenwich Hospital (q.v.) and Royal Naval College (q.v.), and for the Greenwich Royal Observatory, established in 1675, from the meridian of which British astronomers and geographers, and to a great extent those of other nations, calculate their longitude, and whence "Greenwich time" is telegraphed twice daily to all parts of the United Kingdom. In 1911 a bill was passed by France for the adoption of Greenwich time, practically 9 minutes, 21 seconds behind that of Paris. The observatory crowns a hill 180 feet high, in Greenwich Park, a favorite resort of Londoners. Greenwich was a royal residence from the thirteenth to the seventeenth century and was the birthplace of Henry VIII, Queen Mary, and Queen Elizabeth. The borough has extensive engineering establishments, iron steamship-building yards, ropeworks, and factories. Greenwich was once famous for the annual whitebait dinners held by the members of the British cabinet. The last of these dinners was held in 1894, and the celebrated Ship Tavern at which they were given was closed in 1908. Pop., 1901, 95,770; 1911, 95,968.

GREENWICH, grĕn′ĭch, grēn′ĭch. A borough in a town of the same name, Fairfield Co., Conn., on Long Island Sound, 28 miles northeast of New York City, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, A 5). It is a beautifully laid out village containing many fine homes, and is popular as a summer resort and as a residential suburb of New York City. Pop., 1910, 16,463; 1914 (U. S. est.), 18,277.

Greenwich was first settled in 1640 by Capt. Daniel Patrick. It was part of the Dutch Province of New York from 1642 until 1650, when, by the agreement of a Dutch and English commission, it became part of Connecticut and was selected as one of the points to mark the boundary. On Feb. 25, 1779, a troop of 1200 English and Tories under Governor Tryon marched against the place, which was defended by General Putnam with about 100 militia. The latter were soon forced to retreat. Consult *History of Fairfield County, Connecticut* (Philadelphia, 1881) and Mead, *Ye Historie of ye Town of Greenwich* (rev. ed., New York, 1911).

GREENWICH HOSPITAL. An institution for naval pensioners, founded by William III in memory of his Queen. It grants outpensions to old and disabled sailors of the royal navy, and educates their children; it also gives pensions to the widows of men killed or drowned while on duty. The buildings were sufficiently completed by 1705 (at a cost of £50,000) to admit 100 disabled seamen. By July 1, 1708, 350 had been admitted. The income derived from bequests, the original royal grant, and from contributions made under coercion by sailors, amounted to £12,000 a year, half of which was expended in maintaining the charity, and the other half in completing the buildings. In the reign of George II the forfeited estates of the Earl of Derwentwater were granted to the hospital and produced an additional income of about £6000 a year. The compulsory contribution of 6d. a month by every seaman, whether of the naval or merchant service, was in 1834 remitted, an annual grant of £20,000 from the consolidated fund being substituted. The income from all sources by 1865 had reached £150,000 a year, out of which were maintained 1600 pensioners, and the necessary executive and medical officers, nurses, and servants. Many widows of sailors were employed as nurses or servants. In the year 1910–11 the income was £205,740.

In 1865 the institution ceased to exist as an asylum for aged sailors, while its funds were converted into outpensions, providing for a larger number than were maintained in the hospital. The buildings, after lying vacant during the following five years, became a royal naval college. All officers in the combatant branch of the service, on reaching the rank of midshipmen, as well as a number of engineers, were obliged to take a course of study in this college.

Attached to the hospital, which is situated at Greenwich, England, and consolidated with it, is a school for the gratuitous education of 1000 sons of seamen, under the superintendence of the commissioners of the hospital. The education given is such as to fit the recipients for either the navy or the merchant service. The term of study is from three to four years. The Royal United Service Museum, containing many famous historical relics, is also connected with this institution. Consult Fraser's *Greenwich Royal Hospital* (London, 1910).

GREENWICH OBSERVATORY. The leading English astronomical observatory, situated at Greenwich, in lat. 51° 28′ 38.1″ N. and on the prime meridian. It was founded by King Charles II in 1675 for the purpose of securing more accurate knowledge of the positions of the moon and principal stars with a view to promoting navigation. It is under the official control of the Admiralty, and the director is styled the Astronomer Royal. The Astronomer Royal in 1914 was Frank W. Dyson. The equipment includes a fine 8-inch meridian circle with which the fundamental work of taking meridian observations of the sun, moon, planets, and stars is carried on; an 8-inch altazimuth; a 28-inch refractor by Grubb; the Thompson equatorial, consisting of a Grubb 26-inch refractor mounted with the common 30-inch silvered-glass reflector as a counterpoise, the latter being used principally for spectroscopic work; and the astrographic equatorial, consisting of a 10-inch visual and a 12.8-inch photographic refractor mounted side by side, and designed for work in connection with the International Photographic Chart of the Heavens. (See ASTROPHOTOGRAPHY.) The observatory also possesses the 24-inch Newtonian reflector with which Lassell discovered the satellites of Uranus and Neptune. Photographs of the sun are taken on every available day and are stored for reference, forming a continuous sun-spot record since 1873. Magnetic and meteorological observations have been carried on regularly since 1838 and form an important part of the work. A continuous record of the moon's position since the middle of the eighteenth century is contained in the *Astronomical Observations*, the publication of which was begun in 1750; since 1838 it has appeared annually. Bradley laid the foundation of accurate sidereal astronomy by his observations at Greenwich; and in 1908 Melotte discovered the eighth satellite of Jupiter. Among the noted astronomers who have held the position of Astronomer Royal were: John Flamsteed, from 1675 to 1719; Edmund Halley, from 1720 to 1742; James Bradley, from 1742 to 1762; Nevil Maskelyne, from 1765 to 1811; and Sir George Biddle Airy, from 1835 to 1881 (qq.v.).

GREEN′WOOD. A city and the county seat of Leflore Co., Miss., about 90 miles north of Jackson, on the Yazoo River, at the head of navigation, and on the Southern and the Yazoo and Mississippi Valley railroads (Map: Mississippi, E 4). It is an important shipping point for cotton, and has a number of industrial establishments, including oil mills, cotton compresses, furniture, wagon and ice factories, bottling works, lumber and planing mills, etc. The city contains also a Carnegie library, Elks Home, and fine courthouse and school buildings. The water works and electric-light plant are owned by the municipality. Greenwood adopted the commission form of government to take effect in 1915. Pop., 1900, 3026; 1910, 5836.

GREENWOOD. A city and the county seat of Greenwood Co., S. C., 84 miles northwest of Columbia, on the Seaboard Air, the Piedmont and Northern, the Southern, and the Charleston and West Carolina railroads (Map: South Carolina, B 2). It is the seat of the Brewer Normal School for negroes, Lander Female College, Bailey Military Institute, and the Connie Maxwell Orphanage. It has manufactories of overalls, lumber, cottonseed oil, cotton, spools, bobbins, etc. The city owns and operates the water works, electric-light plant, and sewage system. Pop., 1900, 4824; 1910, 6614.

GREEN′WOOD, Frederick (1830–1909). A British journalist, born in London. Early in life he wrote several novels: *The Loves of an Apothecary* (1854); *The Path of Roses* (1859); *Under a Cloud,* with his brother James (1860); and his most pretentious work of fiction, *Margaret Denzil's History* (1864). He was editor of the *Queen* (1861–63) and joint editor (1862–64) and sole editor (1864–68) of the *Cornhill Magazine.* Under his editorship the *Pall Mall Gazette,* which he established with George Smith in 1865, became an influential Conservative organ. In 1875 it was on Greenwood's suggestion that Lord Beaconsfield bought for the government the Khedive's shares in the Suez Canal, thereby forestalling a purchase by France. When the *Pall Mall* went into Liberal hands in 1880, he resigned, editing soon afterward the *St. James's Gazette,* which was started for him by H. H. Gibbs. In 1891–92 he published a weekly review called the *Anti-Jacobin,* which, however, did not gain public support. Later he contributed frequently to various magazines and newspapers, and he wrote *Louis Napoleon Bonaparte* (1853), *The Lover's Lexicon* (1893), and *Imagination in Dreams and their Study* (1894).

GREENWOOD, Grace. See Lippincott, Sara Jane (Clarke).

GREENWOOD LAKE. A picturesque sheet of water, partly in Orange Co., N. Y., and partly in Passaic Co., N. J., 49 miles northwest of Jersey City. The lake is about 6 miles long (northeast by southwest), and has an average width of somewhat more than half a mile. Along its shores are hills from 700 to 1200 feet in altitude; the village of Greenwood lies at its north end.

GREER, David Hummell (1844–). An American Protestant Episcopal bishop. He was born in Wheeling, Va. (now West Virginia), graduated at Washington College (Pa.) in 1862, and studied at the Protestant Episcopal Seminary, Gambier, Ohio. Ordained a priest in 1868, he was rector successively at Covington, Ky. (1868–71), Providence, R. I. (1871–88), and New York City (St. Bartholomew's Church, 1888–1904). In 1903 he was elected Bishop Coadjutor for the New York diocese and in 1908 succeeded Bishop Potter upon the latter's decease. Bishop Greer made himself known as an untiring personal worker in his parishes and his diocese, and as a believer in direct and unceremonious relationship between clergy and laymen. He wrote: *Moral Power of History* (1890); *From Things to God* (1893); *The Preacher and his Place* (1895); *Visions* (1898).

GREER, James Augustin (1833–1904). An American naval officer, born in Cincinnati, Ohio. He entered the navy in 1848 and graduated as midshipman at Annapolis in 1855. In 1861 he was serving as a lieutenant on the *San Jacinto* when Mason and Slidell were seized aboard the *Trent.* During the naval campaigns of 1863 he took part in the siege of Vicksburg. In 1864 he was stationed at the naval recruiting office in Cincinnati to correct abuses there and during the winter of 1866–67 was for four months the protector of American interests at Acapulco, Mexico. He commanded the *Tigress* of the *Polaris* relief expedition in 1873 and was made captain in 1876. The *Constitution, Constellation,* and *Hartford* were successively under his command. He served on various naval boards, was in command of the United States European Naval Station from 1887 to 1889, and in 1892 was made a rear admiral. He was retired in 1895.

GREET, Ben (?–). An English actor manager. He was born in London and was educated at the naval school, New Cross. About 1890 he began presenting Shakespeare's comedies and other pastoral plays outdoors. Subsequently, in connection with the Elizabethan Stage Society, he presented early plays in the original fashion, especially *Everyman,* a fifteenth-century morality play, and many of Shakespeare's plays. His parts include Malvolio, Dogberry, Benedict, Tony Lumpkin, Hamlet, and Triplet, which he played more than 1000 times. In 1902 he toured America with *Everyman* and thereafter was largely identified with the American stage.

GREG, William Rathbone (1809–81). An English essayist. He was born in Manchester and was educated at the University of Edinburgh. For a time he managed a mill of his father's at Bury and began enterprises of his own in 1832; but his preoccupation with political, economic, and theological questions led him in 1850 to give up business for writing. He was an ardent free trader. In 1856 he was appointed Commissioner of Customs and later Comptroller of the Stationery Office. His writings include: *Essays on Political and Social Science* (1853); *Literary and Social Judgments* (1869); *Political Problems* (1870); *Enigmas of Life* (1872); *Rocks Ahead* (1874); *Mistaken Aims and Attainable Ideals of the Working Classes* (1876); *Miscellaneous Essays* (1882).

GREG′ARINE (from Neo-Lat. *Gregarinus,* from Lat. *gregarius,* pertaining to a herd, from *grex,* herd). A parasitic protozoan of the group Sporozoa (q.v.).

GREGG, David McMurtie (1833–). An American soldier, born in Huntingdon, Pa. He studied for a time at the University of Lewisburg (now Bucknell University), graduated at West Point in 1855, and served in many Indian campaigns on the Western frontier until the outbreak of the Civil War. He was made colonel of the Eighth Pennsylvania Cavalry Volunteers, took part in the Peninsula campaign, and in 1862 was promoted to be brigadier general of volunteers. Until August, 1864, he commanded various cavalry divisions of the Army of the Potomac, participating in the battle of Gettysburg, the Richmond campaign, and other important operations, and was brevetted major general of volunteers for his distinguished conduct throughout the war. From August, 1864, until his resignation in 1865 he commanded all the cavalry of the Army of the Potomac. He was United States Consul at Prague, Bohemia, from February to June, 1874, and in 1891 was elected Auditor General of Pennsylvania. He published *Second Cavalry Division of the Army of the Potomac in the Gettysburg Campaign* (1907).

GREGG, John Irvin (1826–92). An American cavalry officer, born in Bellefonte, Pa. He served in the Mexican War, rising to the rank of captain in September, 1847. He entered the Civil War as captain in the Third Cavalry. Very soon afterward he was transferred to the Sixth and in 1862 was made colonel of the Sixteenth Pennsylvania Cavalry. From April, 1863, to April, 1865, he commanded a cavalry brigade in the Army of the Potomac and fought in the battles of Gettysburg and Cold Harbor. He was severely wounded in the action at Deep Bottom and again at Amelia Court House. At the close of the war he was brevetted major general of volunteers and brigadier general in the regular army. In 1866 he was commissioned colonel of the Eighth Cavalry and in 1879 was retired.

GREGG, William (1817–1902). A Canadian Presbyterian clergyman and educator. He was born in Donegal, Ireland, of Scottish parents, and was educated at Glasgow and Edinburgh universities. He came to Canada as a missionary in 1846 and in the following year was ordained to the ministry of the Free Presbyterian church in Canada. After taking several pastoral charges in Ontario he entered Knox College, Toronto, in 1864 as lecturer, and was professor of apologetics from 1892 until his retirement in 1895. In 1861 he was moderator of the Free Presbyterian church in Canada, and in the same year took place the union of that body with the United Presbyterian church of Canada. He published a *Book of Prayer for Family Worship* and *A History of the Presbyterian Church in the Dominion of Canada* (1885).

GRÉGOIRE, grā′gwär′, Henri (1750–1831). A Frenchman, prominent in the Revolution and constitutional Bishop of Blois. He was born of poor parents at Vého, near Lunéville, Dec. 4, 1750. He received his education from the Jesuits at Metz and Nancy and entered into orders. In 1788 he published *Essai sur la régéneration civile, morale et politique des Juifs,* which attracted considerable notice and was crowned by the Academy of Metz. He had meanwhile become curé of Embermesnil in Lorraine, and at the election for the States-General in 1789 he was chosen one of the deputies of the clergy. An ardent Democrat in all his views, he deserted his own class for the Third Estate and immediately began to play a prominent part in the Revolution. He was one of those who advised the secession of the Third Estate and became one of the secretaries of the National Assembly. He was one of the most enthusiastic advocates, on the night of August 4, of the abolition of the privileges of the nobles and clergy. He also gave his support to the civil constitution of the clergy and later accepted election as constitutional Bishop from the Department of Loire-et-Cher, taking the title of Bishop of Blois, although the old Bishop (De Themines) was still alive. In the debates of the Convention, Grégoire continued to be prominent as the representative of his diocese. He was an ardent advocate of the abolition of the kingship and the establishment of a republic. He favored the condemnation of Louis XVI, but sought, by proposing the suspension of the death penalty, to save the life of the unfortunate monarch; nor would he vote for his execution. Already, in 1789, Grégoire had figured as an advocate of negro emancipation, and in 1793 he further interested himself in behalf of the oppressed race, the result being that by a decree of Feb. 4, 1794, slavery was abolished in all the French possessions. After returning from an important diplomatic mission to Savoy in 1793, Grégoire acted on the Committee of Public Instruction and devised measures for the protection, and as far as possible the encouragement, of art, science, and literature. On Nov. 7, 1793, when Gobel, the recreant Bishop of Paris, renounced the Catholic religion and proclaimed the cult of Reason, Grégoire, who was pressed to do likewise, bravely refused. He showed his tolerant spirit by advocating the granting of full civil rights to Jews resident in France. Throughout the later phases of the Revolution and under the Directory, Grégoire continued to take part in public affairs; and to his activity are due many of the measures connected with the public organization of literature and science which still form a part of the French system of administration. After the 18th Brumaire he became a member of the Five Hundred and in 1801 was raised to the Senate. He opposed the proclamation of the Empire, and after the conclusion of the concordat between Pius VII and Bonaparte he ceased to exercise his ecclesiastical functions. Although he was created a count of the Empire and an officer of the Legion of Honor, Grégoire resisted every step towards the establishment of the absolute authority of Napoleon, and in 1814 he was one of the first to pronounce against him. On the Restoration he was most earnest in demanding from Louis XVIII the acceptance of the constitution. During the Hundred Days he attracted no notice; but after the second return of the King he was excluded from the Senate, and, when chosen as a deputy from the Department of Isère, in 1819, his election was annulled. The last years of his life were spent in poverty and obscurity, for he had been expelled from the Institute and refused his pension as an ex-senator. He died at Auteuil, May 28, 1831. Always a devout Catholic, he, however, refused to yield his revolutionary principles. Therefore the Archbishop of Paris refused to give him the last rites of the Church unless he would break his oath to the civil constitution of the clergy. He would not do this, and, in defiance of the Archbishop, clerical friends administered the final sacraments.

Grégoire was a voluminous writer on political and ecclesiastical subjects, among his most important works being *Histoire des sectes reli-*

gieuses (1810) and *Essai historique sur les libertés de l'église gallicane* (1818). For his life, consult: Carnot (ed.), *Mémoires ecclésiastiques, politiques et littéraires de Grégoire* (Paris, 1839); Gregory, *Grégoire, the Priest and the Revolutionist* (Leipzig, 1876); Pressensé, *L'Eglise et la révolution française* (Paris, 1864); Grazier, *Etudes sur l'histoire religieuse de la révolution française* (ib., 1877); A. Pouget, *Les idées religieuses et réformatrices de l'évêque constitutionnel, Grégoire* (ib., 1905).

GREG′ORAS, Nicephorus (c.1295–1359). A priest in Constantinople, who proposed a reformation in the calendar by a plan which came very near exactness. It was practically the same as that later adopted by Gregory XIII. He was a theological controversialist, was much involved in the disputes between the Eastern and Western branches of the Church, and engaged in a dispute with Barlaam (q.v.). He wrote a history of the Byzantine Empire from 1204 to 1359. It is published in Migne, *Patrologia Græca,* cxlviii, cxlix (Paris, 1854–66).

GREGO′RIAN CHANT. The ritual music of the early Christian Church, as revised and introduced by Pope Gregory the Great. How much of a revolution he really made in the then existing Ambrosian forms is a disputed question. There can be, however, no doubt that he began certain needed reforms by the rejection of frivolous embellishments and the establishment of the whole musical system on a more representative basis. A full discussion of the development of mediæval Church music will be found under Plain Chant. See also Sacred Music; Modes.

GREGO′RIA′NUS. A Roman jurist of the third century. Little is known of his life except that he compiled the collection of laws known as the *Codex Gregorianus,* a work which, although transmitted to us in a very imperfect form, is said to have furnished the basis for the later Code of Justinian. Evidences of its value may be found in the frequent references to it by the later lawgivers of the Roman Empire. It was compiled probably about the close of the third century. Consult Sohm, *Institutes of Roman Law,* trans. by Ledlie (2d ed., Oxford, 1901).

GREGOROVIUS, grĕg-ō-rō′vĭ-ụs, Ferdinand (1821–91). A German historian and poet, born at Neidenburg, East Prussia, and educated at Königsberg. He began his travels in Italy in 1852 and wrote in a novel and original manner the series *Wanderjahre in Italien* (1857–77). In 1880 he traveled in Greece and in 1882 in Egypt, Syria, and Turkey; then lived alternately at Rome and Munich until his death in 1891. In the same vein as the *Wanderjahre* are: *Corsica* (3d ed., 1878; trans. into English); *Figuren: Geschichte, Leben und Scenerie aus Italien* (1856); *Siciliana* (1860); *Lateinische Sommer* (1863); *Die Insel Capri* (1868; 3d ed., 1897); *Von Ravenna bis Mentana* (1871); *Apulische Landschaften* (1877). To an earlier period belongs his poetical and critical work, including: *Werdomar und Wladislaw* (1845); *Goethes Wilhelm Meister in seinen sozialistischen Elementen* (1849), a very valuable critique; *Die Polen und Magyarenlieder* (1849); the tragedy *Der Tod des Tiberius* (1851); and the idyllic epic on Pompeii, *Euphorion* (6th ed., 1891). To his historical works belong the *Geschichte des römischen Kaisers Hadrian* (1851; and revised, 1884, under the title *Der Kaiser Hadrian*) and the great works on mediæval Italy: *Die Grabdenkmäler der Päpste* (2d ed., 1881), and his most important work, the *Geschichte der Stadt Rom im Mittelalter* (8 vols., 1859–72; 5th ed., 1906), translated into English by Hamilton, from the fourth German edition, as *History of the City of Rome in the Middle Ages* (1894–1900). An Italian translation appeared at Venice at the expense of the Roman municipality in 1874–76. The work is scholarly and original and in matter and method ranks as one of the greatest historical studies of the century. Further studies in Roman history are: *Lucrezia Borgia* (3d ed., 1875); *Urban VIII im Widerspruch zu Spanien und dem Kaiser* (1879); *Una Pianta di Roma delineata da Leonardo da Besozzo Milanese* (1883). Gregorovius also published: *Kleine Schriften zur Geschichte und Kultur* (1887–92); *Athenais, Geschichte einer byzantinischen Kaiserin* (1882); *Geschichte der Stadt Athen im Mittelalter* (2d ed., 1889); and an edition of the *Briefe Alexanders von Humboldt an seinen Bruder Wilhelm* (1880). Among his posthumous works are: *Gedichte,* edited by Schack (1892); *Römische Tagebücher,* edited by Althaus (2d ed., 1893); and *Briefe von Ferdinand Gregorovius an den Staatssekretär Hermann von Thile* (1894). Consult: Münz, *Ferd. Gregorovius und seine Briefe an Gräfin Lovatelli* (Berlin, 1896); Simonsfeld, article in *Allgemeine deutsche Biographie,* vol. xlix (Leipzig, 1905); Heigel, *Biographisches Jahrbuch für Altertumskunde,* vol. xv (Berlin, 1892).

GREG′ORY (Lat. *Gregorius*). The name of sixteen popes and two antipopes.—Gregory I, the Great (Pope, 590–604). He was born in Rome about 540 of an illustrious family and was a lawyer by profession. As early as 571 he was made prætor of Rome by the Emperor Justin II. By the death of his father he inherited much wealth, which he used for religious purposes. He founded six monasteries in Sicily and one in Rome, with the title of St. Andrew's, and, resigning his office, withdrew from the world and retired to the latter. Previously he had bestowed on the poor his costly robes, his gold, jewels, and furniture, and, refusing the abbacy of the convent, he began with the lowest monastic duties and devoted himself altogether to God. This was probably about 575. In this period of his life is laid the story of the Venerable Bede, that he met the Anglo-Saxon youths in the slave market and, being struck by their beauty and learning that they came from a pagan land, resolved to devote himself to the conversion of that land to Christianity. The story may be only a legend to account for Gregory's interest in England. He is said to have set forth on his journey; but the clamor of the Romans at his loss led the Pope, Benedict I, to compel his return and eventually to enroll him in the secular ministry by ordaining him one of the seven regionary deacons of Rome. Benedict's successor, Pelagius II, sent Gregory as nuncio to Constantinople to implore the Emperor's aid against the Lombards. He resided in Constantinople from 578 to 585, during which time he commenced and perhaps completed his great work, the *Exposition of Job.* On his return to Rome he reëntered his monastery and became abbot and on the death of Pelagius was unanimously called by the clergy, the Senate, and the people to succeed him. He used every means to evade the dignity, but was forced to yield, and was consecrated Sept. 3, 590. Few pontiffs have equaled, hardly one has surpassed, Gregory as the administrator of the concerns of the vast charge assigned to him. To him the Roman church is indebted for the complete and consistent organization of her public services and the details of her ritual, for the regulation and systematization of her sacred chants. The mission to England, which he was not permitted to undertake in person, was intrusted by him (597) with all the zeal of a personal obligation to Augustine (see AUGUSTINE), and under his auspices Britain was brought within the pale of Christian Europe. Under him the Gothic Kingdom of Spain, long Arian, was united to the Church. Nor was his zeal for the reformation of the clergy and the purification of the morality of the Church inferior to his ardor for its extension. On occasion of the threatened invasion of Rome by the Lombards, Gregory performed the part of a true king in protecting the state, and in his general administration he was, in fact, if not yet in avowed authority, a temporal sovereign. Though not a great philosopher, he was a great leader of men. To his administrative skill is due the organization of the mediæval papacy. In his writings, too, the details of the whole dogmatic system of the modern Church are very fully developed. His posthumous fame is of the highest, and he is one of the four greatest doctors of the Western (Latin) church. His works are in Migne, *Patrologia Latina*, lxxv–lxxvi. The best edition of his *Letters* is by Ewald and Hartmann (Berlin, 1891–93). In English have appeared: *The Book of Pastoral Rule*, and many epistles in *Nicene and Post-Nicene Fathers*, 2d series, vols. xii and xiii with prolegomena; his book of *Dialogues* (London, 1874), from which there are extracts in *Little Flowers of Saint Benet, Gathered from the Dialogues* (London, 1901); his *Morals in the Book of Job*, in "A Library of the Fathers of the Holy Catholic Church," vols. xviii, xxi, xxiii, xxxi. Consult: Pfahler (Frankfort, 1852), of which the first volume only was published; Barmby (London, 1879); Snow (ib., 1892); Kellett, *Pope Gregory the Great and his Relations with Gaul* (ib., 1889); Dudden, *Gregory the Great* (2 vols., ib., 1905); Howorth, *Saint Gregory the Great* (ib., 1912); Mann, *Lives of the Popes of the Middle Ages* (ib., 1902–14).

GREGORY II (Pope, 715–731). He was born in Rome in 669 and educated at the Lateran. His pontificate is specially noticeable as forming an epoch in the progress of the territorial preëminence of the Roman see in Italy. The authority of the Eastern emperors in the West had sunk into little more than a name, and the tyrannical and barbarous measures by which the Emperor Leo the Isaurian attempted to enforce his decrees against image worship (see LEO III; ICONOCLASM) weakened still more the tie which bound Italy to the Eastern emperors. The natural result of the diminution of the Imperial authority in Italy was the growth of that of the Pope, to whom the deserted Italian provinces looked, partly as their spiritual counselor and head, partly as their mediator with the barbarous enemy, partly as the centre of the political federation of self-defense which their isolation necessitated. Gregory convened a council in Rome on the subject of the honor due to images and addressed an energetic letter to the Emperor. He built up the monasteries and was a patron of the work of Boniface, the missionary of Germany. He died in Rome, Feb. 10, 731. His *Epistolæ et Canones* are in Migne, *Patrol. Lat.*, lxxxix. Consult Dahmen, *Das Pontifikat Gregors II.* (Düsseldorf, 1888).—GREGORY III (Pope, 731–741). He was a Syrian by birth and followed the policy of his predecessor, Gregory II. In 739 he sent a deputation to Charles Martel, soliciting his succor against the Lombards, and proposing, if it was granted, to recognize him as protector of the Romans and to confer on him the title of "Consul and Patrician of Rome." This offer was made by the Pope "in virtue of a decree of the Roman Primus" and is of great historical importance in the consideration of the nature and origin of the papal power in Italy. Owing to the pressure of the war with the Saracens, the embassy failed; but it was a step towards the consummation of the independence of the West. Gregory bestowed the pallium on Boniface, the Apostle of Germany (732). He died in Rome, Nov. 28, 741. His extant writings are in Migne, *Patrol. Lat.*, lxxxix and xcviii.—GREGORY IV (Pope, 827–844). He was a native of Rome. He tried unsuccessfully to arrange the quarrel between Louis the Pious (q.v.) and his sons and rebuilt Ostia as a defense for the mouth of the Tiber. His *Epistolæ* are in Migne, *Patrol. Lat.*, cvi.—GREGORY V (Bruno of Carinthia) (Pope, 996–999). He was the first German Pope, a relative of the Emperor Otho III. His authority was unsuccessfully disputed by an antipope, John XVI (997–998). His *Epistolæ* are in Migne, *Patrol. Lat.*, cxxxvii.—GREGORY VI (John Gratianus) (Pope, 1045–46). He had been a priest in Rome and bought the papacy from Pope Benedict IX. Sylvester III was also named Pope, and in the conflicts which followed the Emperor took him prisoner, after having compelled his resignation (1046), and brought him to Germany. He died in 1048 at Cologne. His *Epistolæ* are in Migne, *Patrol. Lat.*, cxlii.—GREGORY VI was also the title of an antipope to Benedict VIII in 1012.

GREGORY VII (Hildebrand) (Pope, 1073–85). Preëminently the representative of the temporal claims of the mediæval papacy. He was born in Tuscany about 1020, perhaps at Soana, a village of the southern border. His family belonged to the plebeian class. Although nothing of his remoter ancestry is known, his family name, Hildebrand, would imply a Teutonic descent; but by birth and education at least he was Italian. His youth was passed in Rome, in the monastery of St. Mary, on the Aventine, of which his uncle was abbot, and he probably took monastic vows. The Emperor Henry III took him to Germany, and he continued his studies in Cologne. Very likely he also visited Aix-la-Chapelle and Cluny. He attended the council at Worms at which Bishop Bruno of Toul was chosen Pope (Leo IX), and the latter took him to Rome (1049) and made him a cardinal subdeacon. He had great influence during the pontificate of Leo. On the latter's death (1054) the Roman people manifested a desire to have Hildebrand as successor; but this honor he declined, preferring to gain more experience. Besides important domestic employments which were assigned to him, he was sent as legate to the Council of Tours (1054), in which the cause of Berengarius was examined. (See BERENGARIUS OF TOURS.) He was likewise one of the three legates dispatched to Germany to consult about a successor to Leo IX. Under the four popes who followed Leo—Victor II, Stephen IX, Benedict X, and Alexander II, known in history as the German popes—Hildebrand continued to be the predominant power and inspired into their government of the Church the great principles to which his life was devoted. Three days after the death of Alexander II he was unanimously elected at Rome; but he declined to be consecrated until the Emperor's sanction had been gained. The German bishops, who feared the reforms of which his name was a guaranty, endeavored to prevent the Emperor Henry IV from assenting to the election; but Henry gave his approval, and the new Pope was crowned July 10, 1073. Regarding as the great evil of his time the thoroughly secularized condition of the Church in a great part of Europe, and especially in Germany and northern Italy, Gregory directed against this all his efforts. In his reforming crusade he first attacked the evil of clerical marriage and the probably much less frequent offense of clerical incontinence. These he combated by stirring up the people to refuse the sacraments from any other than a celibate and pure priest. Simony also was denounced in the most explicit and vigorous terms. But it was against the fundamental abuse of investiture (q.v.) that his main efforts were directed. In 1075 he prohibited this practice under the pain of excommunication both for the investor and the invested, and in the following year he actually issued that sentence against several bishops and councilors of the Empire. The Emperor Henry IV (q.v.) disregarding these menaces and taking the offending bishops under his protection, Gregory cited him to Rome to answer for his conduct. Henry's sole reply was a haughty defiance, and in a Diet at Worms, in 1076, he formally declared Gregory deposed from the pontificate. Gregory was not slow to retaliate by a sentence of excommunication; and in this sentence, unless revoked or removed by absolution in 12 months, by the law of the Empire at the time, was involved the forfeiture of all civil rights and deposition from every civil and political office. When, at a Diet held at Tribur (September, 1076), the bishops actually began to discuss the election of a new Emperor, Henry deemed it necessary to appear to yield. Accordingly he sought the Pope, who was then at the castle of Matilda, Countess of Tuscany, at Canossa (q.v.). He arrived there with his wife and son in the dead of a very severe winter. Gregory himself is authority for the statement that the Emperor, "having laid aside all belongings of royalty, wretchedly, with bare feet and clad in wool, continued for three days [Jan. 25–27, 1077] to stand before the gates of the castle," and it was not till the pitiful state of the royal penitent moved all hearts that the Pope admitted him to his presence and absolved him. Henry's submission, however, was but feigned; and on his subsequent triumph over his rival, Rudolf of Swabia, he resumed hostilities with the Pope, and in 1080 again declared him deposed and caused to be appointed in his place the antipope Guibert, Archbishop of Ravenna (see GUIBERT OF RAVENNA), under the name of Clement III. After a protracted siege of three years Henry, in the year 1084, took possession of Rome. Gregory shut himself up in the castle of Sant' Angelo. Just, however, as Gregory was on the point of falling into his enemy's hands, Robert Guiscard, the Norman Duke of Apulia, entered the city, set Gregory free, and compelled Henry to return to Germany; but the wretched condition to which Rome had been reduced obliged Gregory to withdraw, first to Monte Cassino, and ultimately to Salerno, where he died, May 25, 1085. His dying words were: "I have loved justice and hated iniquity; therefore I die in exile." He was canonized in 1728. Gregory's writings, dealing mostly with Church government, are in Migne, *Patrol. Lat.*, xcviii. His *Epistles* were separately edited at Paris (1877); a selection was translated (London, 1853). The literature upon him is abundant, but that written prior to 1850 is superseded by more critical work. Of chief value and interest may be mentioned: Gfrörer, *Papst Gregorius VII und sein Zeitalter* (Schaffhausen, 1859–61; index vol., 1864); Villemain, *Life of Gregory VII* (trans., London, 1874); Stephens, *Hildebrand and his Times* (ib., 1886); Delarc, *Saint Grégoire VII et la réforme de l'église au XIème siècle* (Paris, 1889–90); Vincent, *The Age of Hildebrand* (New York, 1896); Barry, *The Papal Monarchy* (ib., 1902); Mathew, *Life and Times of Hildebrand* (London, 1910); Martens, *Gregor VII, sein Leben und Werken* (Leipzig, 1904). For the numerous special discussions, and in general, consult Cerroti, *Bibliografia de Roma mediævale e moderno*, vol. i (Rome, 1893), and Chevalier, *Répertoire des sources historiques du moyen âge* (Paris, 1887; supplement, 1888).

GREGORY VIII (Pope, 1187). He succeeded Urban III, Oct. 21, 1187, and died eight weeks later. His *Epistolæ et Privilegia* are in Migne, *Patrol. Lat.*, ccii. Consult the dissertation of Nadig, *Gregors VIII. 57 tägiger Pontifikat* (Basel, 1890).—GREGORY VIII was also the title taken by Mauritius Burdinus, Archbishop of Braga, set up as antipope to Gelasius II by the Emperor Henry V in 1118. He was taken prisoner by the successor of Gelasius, Calixtus II, in 1121, and died in captivity, 1125.—GREGORY IX (Ugolino, Count of Segni) (Pope, 1227–41). He followed the policy of Gregory VII and had a long dispute with the Emperor Frederick II (q.v.), whom he twice excommunicated. The Emperor marched upon the papal territories, took Ravenna, and intercepted a fleet from Genoa which was conveying a hundred Church dignitaries to Rome. Gregory died before the trouble was settled. He was active in strengthening the orders of monks and made an attempt to bring the Eastern church into union with Rome. He instituted the Monastic Inquisition and gave it in charge to the Dominicans. For his life, consult: Balan (Modena, 1872–73); J. Marx, *Die Vita Gregorii IX quellenkritisch untersucht* (Berlin, 1890); Felten, *Papst Gregor IX* (ib., 1886); Auvray (ed.), *Les registres de Grégoire IX, 1227–35* (Paris, 1890–96). His *Epistolæ* are in D'Achery, *Spicilegium*, vol. iii (ib., 1723).—GREGORY X (Teobaldo di' Visconti) (1210–76) (Pope, 1271–76). He was born at Piacenza, Italy, 1210. At the time of his election (1270) he was in the Holy Land as a crusader. He arrived at Rome, March 13, 1271, and was consecrated Pope March 27. He held at Lyons the fourteenth general synod for action upon (1) the Greek schism, (2) the Saracen oppression of the Holy Land, and (3) the moral degeneracy of the times. The synod was opened by the Pope in person, May 7, 1274. He exerted himself to attain the ends sought and succeeded as far as the council was concerned. But the plans for a crusade came to nothing; the union with the Greeks was short-lived, and the times did not noticeably improve. He died in Rome, Jan. 10, 1276. Consult J. Guiraud (ed.), *Les registres de Grégoire X* (Paris, 1892–98).—GREGORY

XI (Pierre Roger de Beaufort) (1331–78) (Pope, 1370–78). He was born in 1331, chosen Pope at Avignon, Provence, 1370, and was the last of the French popes. At the request of the Romans, and influenced by the pleadings of St. Catharine of Siena, he returned to Rome in 1377, and there he died, March 27, 1378. The works of Wiclif came under his censure. Consult Chaillan, *Recherches et documento inédito sur l'orphanotrophium du pape Gregoire XI à Avignon* (Avignon, 1904).—Gregory XII (Angelo di Corario) (1327–1417) (Pope, 1406–15). He was a Venetian and was chosen Pope in 1406. He was deposed by the Council of Pisa (1409), but held on till at the Council of Constance (1415) he voluntarily abdicated. (See Constance, Council of.) He died as Cardinal Bishop of Porto, Oct. 18, 1417.

Gregory XIII (Ugo Buoncompagno) (Pope, 1572–85). He was born in Bologna, Jan. 7, 1502. He was educated in his native city, where he held the professorship of law for several years. He settled in Rome in 1539 and was one of the theologians of the Council of Trent (q.v.). On his return to Rome he was created Cardinal in 1564 and sent as legate to Spain. On the death of Pius V, Gregory was elected Pope in 1572. He showed great zeal for the promotion and improvement of education, especially for the clergy, as a means of combating Protestantism; a large proportion of the colleges in Rome were wholly or in part endowed by him, and his expenditure for educational purposes is said to have exceeded 2,000,000 Roman crowns. The most interesting event of his pontificate is the correction of the calendar (see Calendar), which was the result of long consideration, and was finally proclaimed in 1582. When the news of the Massacre of St. Bartholomew reached Rome, Gregory and his cardinals solemnly celebrated the event at the church of San Marco, on Sept. 6, 1572, as the suppression of a conspiracy not alone against Charles IX, King of France, but also against the Church. He had a medal struck with his portrait on the obverse, and on the reverse an angel bearing a cross and sword, while the inscription reads, *Hugonotorum strages* (Overthrow of the Huguenots). Gregory did much to help the Jesuits. He died in Rome, April 10, 1585, in the eighty-third year of his age. He published in 1582 a valuable edition of the *Decretum Gratiani.*—Gregory XIV (Niccolò Sfondrati) (1535–91) (Pope, 1590–91). He was a native of Cremona. He put Henry IV of France under the ban (1591).—Gregory XV (Alessandro Ludovisi) (1554–1623) (Pope, 1621–23). He was born in Bologna, 1554. Although an old and infirm man when chosen Pope, his pontificate, thanks to his nephew, Ludovico Ludovisi, whom immediately after his elevation he made Cardinal at the early age of 25, was a very successful one. The Counter Reformation (q.v.) accomplished much in Bohemia, Austria, and Hungary; the Congregation for the Propagation of the Faith, and the Papal Conclave as at present carried on, were established.

Gregory XVI (Bartolommeo Alberto Cappellari) (1765–1846) (Pope, 1831–46). He was a Venetian, who became a Camaldolese monk, ultimately rose to the head of the order, was learned in Eastern languages and a teacher of theology. When Napoleon carried Pius VII away as a prisoner in 1809, Cappellari left Rome for his native place and remained in quiet for three years. On the return of the Pope (1814) he was promoted to various important positions and in 1826 was made Cardinal and the Prefect of the Propaganda (q.v.). In this capacity he was practically Minister of Foreign Affairs. He made an agreement with the Netherlands regarding Roman Catholic citizens, regulated Church matters in the United States, and secured emancipation for the Catholics in Armenia from the Sultan. He was elected to the papacy Feb. 2, 1831, and for 15 years was zealous and energetic in promoting the interests and expanding the power and influence of the Church. He was a munificent patron of architecture, engineering, and literature. His famous work, *The Triumphs of the Papacy* (Rome, 1799), has been translated into German and French and incorporated in Migne's *Démonstration évangélique* (vol. xvi). He was a bad financier and left the papal treasury in difficulties. For his life, consult: Sylvain (Paris, 1889); Cardinal Wiseman, *Recollections of the Last Four Popes, and of Rome in their Times* (London, 1858); Gavazzi, *My Recollections of the Four Last Popes* (ib., 1857).

GREGORY V (1739–1821). A Greek Patriarch of Constantinople. He was born at Dimitzana in Arcadia and was baptized Georgios Angelopulos. Educated at Mount Athos, he was an anchorite for many years; became Bishop of Smyrna (1784) and Patriarch of Constantinople (1795). At this time, during the difficulties between France and Turkey over Egypt, he was accused by the Turkish populace of treason and banished to Athos. His studies there made him a great educational power, when he was recalled to Constantinople in 1806, and contributed to his reinstatement as Patriarch in 1819 after a second banishment of 11 years. On the outbreak of the Greek Revolution Gregory anathematized the rebels; but he was accused of giving them secret assistance, and on Easter Day, 1821, he was hanged by the Janizaries in his patriarchal robes at the main entrance of his own church, together with three bishops and eight novices. His body, which was mutilated and thrown into the sea, was rescued and buried in the cathedral at Athens. Gregory wrote a translation in modern Greek of the Epistles of Paul, with a commentary.

GREGORY, Augusta, Lady (?–). An Irish dramatist, *née* Isabella Augusta Persse, of an old Galway family of Roxborough. In 1880 she married Sir William Henry Gregory (1817–92), of Coole Park, Galway, who had been member of Parliament for Galway and Dublin and Governor of Ceylon, where he founded the Colombo Museum, and whose *Autobiography* Lady Gregory edited in 1894. In 1898 she edited *Mr. Gregory's Letter Box*, the correspondence in 1812–30 of her husband's grandfather, William Gregory (1766–1840), Undersecretary of State for Ireland. Deeply interested in the movement known as the Irish Literary Revival, which was well under way in the nineties, Lady Gregory was a constant friend of William Butler Yeats, on the whole the representative man of that movement, who owed much to her help and encouragement. Her renderings of the Irish sagas in *Cuchulain of Muirtemne* (1902) and *Gods and Fighting Men* (1904) are substantial literary achievements, and, more closely than other translations, they stand in a relation to Irish romance which corresponds to the relation of the works of Malory and Lady Charlotte Guest to the Arthurian romances. A novel and most effective feature of Lady Gregory's renderings is the use of the Irish idiom, the modified form of English fashioned by the Celtic peasant to express better the thoughts and feelings which had formerly found utterance in the expiring Gaelic tongue. Taking a lively interest in the dramatic side of the Literary Revival, Lady Gregory devoted herself especially to the Irish Literary Theatre in Dublin, which she and Yeats and Edward Martin and George Moore were instrumental in founding in 1899, and which now is comfortably established as the endowed Abbey Theatre. In addition to her two most important books named above, Lady Gregory also wrote stories, sketches, and short plays. Her work as a playwright grew out of the assistance she rendered to Yeats in his dramatic activities—George Moore says she collaborated with Yeats in *Kathleen ni Houlihan* and *A Pot of Broth*—and one interesting phase of it was her translations of three plays of Molière into the Irish idiom, which were published as *The Kiltartan Molière* (1910). She had applied the same procedure to Sudermann's *Teja* in 1908 and to Goldoni's *Mirandolina* in 1910. Her interest in the Irish Players brought her to America with them in 1911–12 and in 1913. Her important books, in addition to those named above, are: *Poets and Dreamers* (1903); *Gods and Fighting Men* (1904); *Saints and Wonders* (1908); *The Kiltartan Wonder Book* (1910); *Seven Short Plays* (1911); *The Kiltartan History Book* (1912); *Irish Folk History Plays* (1912); *New Comedies* (1913). See Irish Literature, *in English*, and consult: Horatio S. Krans, *W. B. Yeats and the Irish Literary Revival* (New York, 1904); Lady Gregory, *Our Irish Theatre* (ib., 1913); Weygandt, *Irish Plays and Playwrights* (Boston, 1913); and George Moore's unsympathetic but brilliant and entertaining account of his decade's experience of the Irish Literary Revival in the three volumes of his trilogy *Hail and Farewell* (New York, 1911–13).

GREGORY, Benjamin (1820–1900). An English Wesleyan Methodist clergyman. He was a student at the Woodhouse Grove School for 13 years, entered the ministry in 1840, in 1869 was appointed one of the connectional editors, and from 1880 to 1893 was sole editor for his church. He was the author of *The Holy Catholic Church, The Communion of Saints* (the Fernley Lecture for 1873); *The Thorough Business-Man, Memoir of Walter Powell* (1872); *Side Lights on the Conflicts of Methodism* (1899).

GREGORY, Cape. See Cape Arago.

GREGORY, Caspar René (1846–). An American biblical scholar, born in Philadelphia, Pa. After graduating at the University of Pennsylvania in 1864 and at Princeton Theological Seminary in 1870, he studied at Leipzig, where he received the degree of Ph.D. in 1876. He rendered an important service to philology and biblical criticism in furthering the work on the New Testament text left uncompleted by Konstantin von Tischendorf (q.v.) and in discovering new manuscripts. He is one of the few Americans who have held an academic position in a German university—that of professor of New Testament exegesis in the theological faculty at Leipzig. He was connected editorially with the *Systematic Theology* of Dr. Charles Hodge (1870–73), and with Schürer and Harnack's *Theologische Litteraturzeitung* (1876–84). Under the title *Saint John the Author of the Fourth Gospel* (Edinburgh, 1875), he translated Luthardt's *Der Johanneische Ursprung des vierten Evangeliums*, and he also published a translation of the same author's *Das Johanneische Evangelium* as *Commentary on Saint John's Gospel* (1876–78). His original writings include pamphlets on Tischendorf (1875); *Les cahiers des manuscrits grecs* (1885); the *Prolegomena* to Tischendorf's *Editio Octava Critica Major* of the New Testament, the three parts of which appeared in 1884, 1890, and 1893; *Textkritik des Neuen Testament* (3 parts, 1900, 1902, 1909); *Canon and Text of the New Testament* (1907); *Einleitung in der Neuen Testament* (1909).

GREGORY, Daniel Seelye (1832–1915). An American Presbyterian clergyman and editor, born in Carmel, N. Y. He graduated at Princeton College in 1857 and at Princeton Theological Seminary in 1860; was tutor in rhetoric at Princeton from 1858 to 1860, and held several pastorates up to 1871, when he was appointed professor of metaphysics and logic at Wooster University. Four years later he was transferred to the chair of English literature. From 1878 to 1886 he was president of Lake Forest University. He received the degree of LL.D. from Wooster University in 1895. In 1890–94 he was managing editor of the *Standard Dictionary*, in 1895–1904 was editor of the *Homiletic Review*, and in 1904 became managing editor of the *Bible Student and Teacher.* His publications include: *Christian Ethics* (1875); *Why Four Gospels?* (1877); *The Tests of Philosophic Systems* (1886); *The Church in America and its Baptisms of Fire* (1896), with S. B. Halliday; *The Crime of Christendom* (1900); *Bible League Primer No. 1* (1904); *Constructive Studies in John, the Gospel for the Christian* (1909).

GREGORY, David (1661–1708). A Scottish astronomer, born in Aberdeen and educated at Marischal College and the University of Edinburgh. Shortly before graduating at the latter institution in 1683, he had been appointed professor of mathematics there, holding this position for eight years, during which time he added extensively to the methods of quadratures discovered by his brother James Gregory (q.v.), besides actively advocating the philosophy of Newton. From 1691 until his death he was Savilian professor of astronomy at Oxford, was elected a fellow of the Royal Society in 1692, and in 1705 was made honorary fellow of the Edinburgh Royal College of Physicians. His most important writings, besides numerous papers in the *Proceedings* of the Royal Society, are: *Exercitatio Geometrica de Dimensione Figurarum* (1684); *Catoptricæ et Dioptricæ Elementa* (1695); *Astronomiæ Physicæ et Geometricæ Elementa* (1702); *Euclidis Opera Omnia* (1703). Several manuscript treatises and notes on Newton's philosophy were found after his death, and in 1745 his lectures on mathematics were published as *A Treatise of Practical Geometry.*

GREGORY, Edward John (1850–1909). An English genre painter, born at Southampton. He was a pupil at Southampton of Hubert Herkomer, with whom he then studied in the South Kensington Art Schools. He assisted his master in the decorations of South Kensington Museum and was associated with him on the *Graphic* till about 1875. He was elected to the Royal Academy in the same year and received gold medals at the national exhibitions of Paris

(1889 and 1900), Brussels (1898), and at Munich in 1891. Gregory is best known for his water colors and drawings, which surpass his oils. He was elected member of the Royal Institute of Painters in Water Colors in 1876, president in 1898. His paintings include "St. George," "The Signal," "A Rehearsal," "Drawing-Room Day," "Marooning" (Tate Gallery, London), "Sir Galahad," and "Is It a Mouse?" Among his best water colors are "The Honeymoon" and "The Fugitive."

GREGORY, Eliot (1854–1915). An American author and painter. He was born in New York City, studied at Yale University, and received his art education at Rome and in Paris under Carolus Duran. He exhibited painting and sculpture in the Paris Salon, where his painting entitled "Children" received honorable mention. Besides his portraits, two of his best-known pictures are "Soubrette" (1883) and "Coquetterie" (1884). He was a founder of the New Theatre, New York, and became a director of the Metropolitan Opera, New York, and Chevalier of the Legion of Honor. Under the pen name of "An Idler," he published, besides *Idler Papers,* two volumes of essays, *Worldly Ways and By-Ways* (1898) and *The Ways of Men* (1900), for the most part made up of clever though superficial reflections upon current American society.

GREGORY, Elisha Hall (1824–1906). An American physician and surgeon, born in Logan Co., Ky. He graduated from the medical department of the University of St. Louis in 1849 and thereafter practiced in that city. In 1851 he became professor of surgery at the St. Louis Medical College (Washington University). He also served as president of the State Board of Health of Missouri, of the St. Louis Medical Society, of the State Medical Association of Missouri, and of the American Medical Association in 1887.

GREGORY, Francis Hoyt (1789–1866). An American naval officer, born in Norwalk, Conn. He entered the merchant service in 1807, was appointed a midshipman in the United States navy in 1809, served on several vessels, engaged in the suppression of the slave trade, and on the outbreak of the War of 1812 was attached to the command of Commodore Chauncey on Lake Ontario. In 1814 he was captured by the British and confined as a prisoner in England until the close of hostilities. In 1815–16 he served against the Algerine pirates, and in 1821–23, in command of the *Grampus,* took part in the expeditions against pirates in the West Indies and in the Gulf of Mexico, where he captured the notorious *Pandrita.* He became a captain in 1838 and commanded the *Raritan* of the blockade squadron during the Mexican War. From 1849 to 1852 he was in command of the African squadron. In July, 1861, he was made superintendent of the construction of the new iron war vessels and attained the rank of rear admiral on the retired list in July, 1862.

GREGORY, Herbert Ernest (1869–). An American geologist. He was born at Middleville, Mich., and was educated at Yale University (A.B., 1896; Ph.D., 1899), where he was assistant in biology (1896–98), instructor in physical geography (1898–1901), assistant professor of physiography (1901–04), and Silliman professor of geology after 1904. He also became a geologist of the United States Geological Survey and associate editor of the *American Journal of Science.* His papers deal chiefly with the geology of Connecticut and glacial geology, and he is part author of *Physical and Commercial Geography* (1910).

GREGORY, James (1638–75). A Scottish mathematician and inventor, born at Aberdeen and educated at Marischal College in that city. At the age of 23 he invented the reflecting telescope known by his name, which he described in a work entitled *Optica Promota* (1663). About 1665 he went to the University of Padua, where he continued his scientific studies. In 1667 he produced his *Vera Circuli et Hyperbolæ Quadratura,* followed in 1668 by two other works, *Geometricæ Pars Universalis* and *Exercitationes Geometricæ.* On his return to London he was elected a fellow of the Royal Society, and in 1669 he obtained the professorship of mathematics at St. Andrews. In 1674 Gregory was called to Edinburgh to fill the chair of mathematics.

GREGORY, James (1753–1821). A Scottish physician, born at Aberdeen, the son of John Gregory (1724–73). He studied at the University of Edinburgh and at Christ Church, Oxford, where he acquired a considerable knowledge of the classics; graduated from the medical department of the University of Edinburgh in 1774, and continued his studies at continental universities until 1776. Upon his return he was made professor of medicine at Edinburgh and in 1777 began to lecture at the Royal Infirmary. In 1790 he became professor of the practice of medicine and continued lecturing upon that subject until his death. He was acknowledged to be the foremost medical practitioner and lecturer in Scotland during his maturity; but he preferred to display his great mental powers in controversy rather than in the advancement of medical science. In 1809 he became involved in a long argument against a recommendation to allow more freedom to members of the Edinburgh medical faculty, was charged with divulging university proceedings, and was suspended from fellowship in the college. His principal writings are: *De Morbis Cœli Mutatione Melendis* (1774); *Conspectus Medicinæ Theoreticæ* (2 vols., 1780–82); *Theory of the Moods of Verbs* (1790); *Philosophical and Literary Essays* (1792); *Memorial to the Managers of the Royal Infirmary* (1780); *Historical Memoirs of the Medical War in Edinburgh in the Years 1785–86–87; Epigrams and Poems* (1810).

GREGORY, John (1724–73). A Scottish physician, grandson of James Gregory the mathematician. He was born at Aberdeen, was educated at King's College (Aberdeen), at Edinburgh, and at Leyden, was professor of philosophy at King's College from 1746 to 1749, became professor of the practice of physic at Edinburgh in 1766, and enjoyed a high reputation as a teacher and practicing physician. His complete works were published at Edinburgh in 1788.

GREGORY, John Milton (1822–98). An American educator, born at Sand Lake, N. Y., and educated at Union College. After a brief study of law he took up theology and was ordained as a pastor in the Baptist faith; but he soon abandoned his pastoral duties for educational work in the West. He was appointed principal of a classical school in Detroit, Mich., and served as State Superintendent of Public Instruction from 1858 to 1863. In 1854 he assisted in the establishment of the *Michigan Jour-*

nal of Education, which he edited for several years. He was president of Kalamazoo College, Mich., from 1863 to 1867, and from 1867 to 1880 was the first president of the Illinois Industrial University (now the University of Illinois). In 1873 he served as United States Commissioner to the World's Fair at Vienna, and he was a member of the United States Civil Service Commission from 1882 to 1885. His publications include: *Handbook of History* (1866); *Map of Time* (1866); *New Political Economy* (1882); *Seven Laws of Teaching* (1883); *Political Economy* (1887).

GREGORY, Olinthus Gilbert (1774–1841). An English mathematician, born at Yaxley, Huntingdonshire. He was professor at the Royal Military Academy, Woolwich, from 1807 to 1838. His most important contributions to physical science were his experiments, made in 1823, to determine the velocity of sound. He was one of the projectors of London University, edited the *Gentleman's Diary* (1802–19) and the *Ladies' Diary* (1819–45), and published treatises on astronomy and mechanics, *Letters on the Evidences of the Christian Religion* (1815), and memoirs of *John Mason Good* (1828) and of *Robert Hall* (1833).

GREGORY, Order of Saint. A papal order founded in 1831 by Gregory XVI and reorganized in 1834. It was originally bestowed as a reward for services in defense of the Roman church, but is now given for any distinguished achievement.

GREGORY, Robert (1819–1911). An English clergyman of the Established church. He was educated at Corpus Christi College, Oxford. Between 1843 and 1853 he was curate at Bisley, Panton, Wragby, and Lambeth, and from 1853 to 1873 he served as rector of the church of St. Mary the Less at Lambeth. In early life he participated in the controversy over religious education in the elementary schools. He became canon in 1868 and dean in 1891 of St. Paul's Cathedral, which he succeeded in making a place of popular worship. He published *A History of Elementary Education* (1895) and *Lectures at St. Paul's.* Consult his autobiography, edited by W. H. Hutton (London, 1912).

GREGORY, Stephen Strong (1849–). An American lawyer, born at Unadilla, Otsego Co., N. Y. He was educated at the University of Wisconsin (A.B., 1870; LL.B., 1871), practiced law at Madison, Wis., in 1871–74, and after 1874 was a member of several law firms, finally of the firm of Gregory, Poppenhusen, and McNab in Chicago. He represented the city of Chicago before the Supreme Court of the United States in the Lake Front case, was counsel for defense in the Prendergast murder case, upheld the constitutionality of the law establishing the Sanitary District of Chicago, and obtained a jail sentence for Eugene Victor Debs as the leader of the great American Railway Union strike. He was president of the Chicago Bar Association in 1900, of the Illinois State Bar Association in 1904, and of the American Bar Association in 1911.

GREGORY, Thomas Watt (1861–). An American lawyer and cabinet officer, born at Crawfordsville, Miss. He graduated from the Southwestern Presbyterian University at Clarksville, Tenn., in 1883, studied law at the University of Virginia in 1883–84, and graduated from the law department of the University of Texas in 1885. Admitted to the Texas bar in the latter year, he then practiced law in that State, was city attorney of Austin in 1891–94, and became a member in 1900 of Gregory and Batts, who were special counsel to the State of Texas in the prosecuting of corporations violating the antitrust laws (the firm name was changed to Gregory, Batts, and Brooks in 1908). In 1913 Gregory became special Assistant Attorney-General of the United States in the investigation of the New York, New Haven, and Hartford Railroad; and in 1914 he was appointed United States Attorney-General by President Wilson.

GREGORY, William King (1876–). An American paleontologist. He was born in New York City and graduated (A.B., 1900; Ph.D., 1910) from Columbia University, where he became a lecturer on zoölogy in 1907. He was also appointed research assistant and associate in vertebrate paleontology at the American Museum of Natural History. His investigations cover the evolution of teleostomous fishes and the orders of mammals.

GREGORY OF ARMENIA, called The Illuminator (c.257–332). The apostle of Christianity among the Armenians. Little is known of his early history, and the facts of his life are so mingled with fiction that it is difficult to separate them. He is said to have been born at Valarshabad, the capital of the Province of Ararat, Armenia, about 257, and educated at Cæsarea in Cappadocia, where at the same time he was instructed in the Christian religion. He afterward entered into the service of Tiridates III, King of Armenia, by whom he was subjected to severe persecution on account of his refusal to worship idols. Some severe public calamity which followed being looked upon as a proof of divine wrath, and the King being himself afflicted, both the ruler and his subjects put themselves under Gregory's instruction. The people were converted in great numbers, and churches immediately erected throughout the country; and Gregory, after receiving ordination at Cæsarea (302), returned as Metropolitan of Armenia and baptized his converts. He is said to have retired from office in 331 to live in a cave and to have died there in 332. The memory of Gregory is held in great reverence in the Greek, Coptic, Abyssinian, and Armenian churches, and he is one of the saints of the Roman Catholic Calendar. He did not introduce Christianity into Armenia, but seems to have been influential in placing this religion in control of the land. The discourses attributed to him are probably spurious. There are two lives in Armenian accessible—one in a French translation by Langlois in vol. i of his *Historiens de l'Arménie* (Paris, 1867), and the other in the English translation by Malan, *Life and Times of Saint Gregory the Illuminator* (London, 1868); other lives and his works are in Migne, *Patrologia Græca*, cxvii, and in the *Ante-Nicene Fathers*, vol. vi. See Armenian Church.

GREGORY OF NA'ZIAN'ZUS, Saint, called The Theologian (c.329–389). Bishop of Constantinople, and one of the "three Cappadocians," famous leaders of orthodoxy in the latter half of the fourth century, the other two being Basil the Great (of Cæsarea) and Gregory of Nyssa (q.v.). He was born probably in 329. His father, who bore the same name, was for many years Bishop of Nazianzus, a town in southwest Cappadocia, identified by Ramsay with the modern Nenizi. Gregory enjoyed the best educational advantages, studying at Cæsarea of Cappadocia, at Cæsarea of Palestine, and at Athens, where Basil and Julian (afterward Emperor) were among his fellow students. Some of the most celebrated rhetors of the fourth century were his teachers. Study and travel occupied all his time up to about his twenty-eighth year, when he returned home and was baptized. He more than once visited his friend Basil at his hermitage in Pontus, seeming inclined to remain there. But his unexpected ordination to the presbyterate, at the hands of his father, made it necessary for him to settle at Nazianzus, where he preached, and eventually assisted his aged father in episcopal functions also, although never made Bishop of that see.

After Basil had been persuaded to abandon his solitary life and assume the duties of Bishop of Cæsarea (370), he consecrated Gregory Bishop of Sasima, an obscure village, where he never actually served. This appointment temporarily threatened a rupture of the friendship between Basil and Gregory, as their letters show. After his father's death and a period of retirement to Seleucia, he accepted an appeal to come to Constantinople as leader of the orthodox Christians of that frankly Arian city. At the head of the only Catholic parish in the capital, and in the face of public opinion overwhelmingly hostile to his views, Gregory's power as a preacher steadily gained for him influence and enlarged his following. He called his church *Anastasia* (resurrection), to symbolize the revival of the true faith, in opposition to Arianism. When the religious policy of Theodosius had turned the state church back to orthodoxy, and the Second Ecumenical Council (Constantinople, 381; see CONSTANTINOPLE, COUNCILS OF) had registered its verdict correspondingly, Gregory was made Bishop of the patriarchal city and Primate of the East. But opposition, arising in part from the defeated Arians, in part from criticism of his translation from Sasima, and in part from the disappointment of rival candidates, led Gregory speedily to resign his position. Weary of controversy, he withdrew from Constantinople and passed the remaining eight or nine years of his life in quiet near his old home. He died in 389 or 390.

Gregory is famous chiefly as a theologian and defender of the orthodoxy of his time. To the three Cappadocians together is due the final triumph of the Nicene theology over Arianism, so far as that was independent of politics. And to Gregory belongs the credit of leading the way to this end by formulating the orthodox doctrine in such a way as to command support. The result was the definition of the Trinity as consisting of one substance, or essence, and three hypostases, or persons. (See HOMOOUSION; HYPOSTASIS.) If Athanasius emphasized the *oneness* of God, Gregory emphasized His *threefoldness*. And so far did he push this conception that he was charged with teaching tritheism. His theological system is best studied in the famous *Theological Orations*, five in number, originally delivered in Constantinople. We have from him 40 other addresses and sermons, among them two denunciations of Julian the Apostate; many letters; and a considerable number of poems, partly autobiographical. Together with Basil, he prepared the *Philocalia*, a collection of excerpts from Origen, of great value.

The best edition of Gregory's complete works is still the Benedictine (2 vols., Paris—i edited by Clemencet, 1778; ii edited by Caillau, 1840, reprinted by Migne, *Patrologia Græca*, vols. xxxiv–xxxviii, Paris, 1857–62); a good modern edition of the *Five Theological Orations* is by Mason (Cambridge, 1899). The *Nicene and Post-Nicene Fathers*, 2d series, vol. vii (New York, 1894), contains an unsatisfactory translation of selected orations and letters. In general, consult Smith and Wace, *Dictionary of Christian Biography* (London, 1877–87), article "Gregorius Nazianzenius." A popular treatment is in Farrar, *Lives of the Fathers*, vol. i (Edinburgh, 1889). For literary criticism, consult Krumbacher, *Geschichte der byzantinischen Litteratur* (2d ed., Munich, 1897).

GREGORY OF NYSSA, nĭs′sȧ, SAINT. A Greek Church father, who flourished during the latter part of the fourth century. He is one of the famous "three Cappadocians" (Basil of Cæsarea, Gregory of Nazianzus, and Gregory of Nyssa), and a younger brother of Basil. The dates of his birth and death are uncertain, but he died after 394. Gregory's early education was of the best, and we see evidences of his rhetorical training in his fine literary style. There is no good reason to doubt that he was married. About the year 371 Basil forced Gregory to accept the bishopric of Nyssa, a village of Cappadocia, whose chief claim to distinction is that he presided over its church.

From the outset Gregory encountered opposition on the part of the Arians, who were numerous and powerful throughout the East, and who enjoyed court favor under the Emperor Valens. A local synod deposed Gregory in 376, and he was banished by the Emperor's command. The death of Valens and the accession of Theodosius mark a turning point in the history of Arianism and usher in the triumph of the Nicene orthodoxy. Gregory was restored to his see (378), and from this time onward his sphere of influence widens. He went to Antioch, Palestine, Constantinople, and Arabia, everywhere aiding in establishing the Catholic faith. He was an influential member of the Second Ecumenical Council, held at Constantinople in 381. (See CONSTANTINOPLE, COUNCILS OF.) There is no reason to believe that he wrote the clauses said to have been added to the Nicene symbol at that time. (See NICENE CREED.) But his influence upon the final formulation of the doctrine of the Trinity was considerable, especially in drawing a distinction between the one divine essence, or substance, and the three hypostases, or persons. (See ARIUS; HYPOSTASIS; HOMOOUSION.) He also emphasized the attributes of the three persons in the Trinity, viz., that the Father is eternally Father, unbegotten; that the Son is eternally begotten; and that the Holy Spirit eternally proceeds (from the Father). In addition to these fundamental articles of the faith, Gregory maintained certain ideas, derived from Origen, which never met with favor in the Church, notably the theory of a final restoration of all men to harmony with God (the *apokatastasis*). He visited Constantinople three times after the Council of 381. On one of these occasions he delivered funeral orations over the Princess Pulcheria and the Empress Flaccilla. We hear of him for the last time in 394.

Gregory had none of those accidental marks of distinction which attach to popes and patriarchs. His episcopal see was insignificant, except as he himself shed lustre upon it. His place in history depends upon his service to the development of Catholic theology and in particular to the formulation of the trinitarian dogma. His doctrinal views may be read in his extensive work *Against Eunomius* (who was a pronounced Arian); in his book *Against Apollinarius;* or in his *Great Catechism*, which was designed for the use of the clergy in dealing with candidates for admission to the Church. In his treatise on *The Soul and the Resurrection* we have an illustration of his power as a speculative philosopher; in that *On Virginity* we may examine one side of his ethical system and also notice his regret that he is himself shut out by marriage from the more excellent life he praises. An adequate edition of his works is much to be desired.

Bibliography. Migne, *Patrologia Græca*, vols. xliv–xlvi (Paris, 1863), gives the text of most of Gregory's works. Consult also an edition of the *Oratio* by Strawley (Cambridge, 1903). An English translation by Moore and Wilson is given in *The Nicene Fathers*, 2d series, vol. v (New York, 1893). In general, consult the article "Gregorius Nyssenus," in Smith and Wace, *Dictionary of Christian Biography* (London, 1877–87); Harnack, *History of Dogma*, vol. iv (Eng. trans., Boston, 1898); Vollert, *Die Lehre Gregors von Nyssa vom Guten und Bösen* (Leipzig, 1897).

GREGORY OF TOURS, to͞or (Lat. *Gregorius Turonensis*), originally called GEORGIUS FLORENTIUS (538–594). A celebrated ecclesiastic, the chronicler of Frankish history. He was born in Auvergne, Nov. 30, 538. His family was of high rank and distinguished for piety, having furnished several bishops to the see of Tours. Gregory was educated under the direction of his uncle, St. Gallus, Bishop of Clermont, and, after the latter's death, of St. Avitus, also afterward Bishop of Clermont. Ordained deacon (563), Gregory left Auvergne and went to the court of Sigebert, King of Austrasia. In 573 he was elected to the see of Tours, and was consecrated by Giles Archbishop of Rheims. The first years of his episcopacy were a season of great perplexity, owing to the contentions of the Merovingian kings. By resisting royal authority on some occasions he drew upon himself the hatred of Queen Fredegunda of Neustria and her husband, King Chilperic. Gregory was accused of seditious and other treasonable actions and summoned before a council of bishops in 580. Here, however, he defended himself with such clearness and vigor that Chilperic ceased to be his foe and trusted him afterward with many important political missions. No less favored by the King's successors, Guntram and Childebert II, Gregory used all his influence with the court for the advantage of the Church. His travels had, apart from their political purposes, the object of everywhere restoring peace and piety. His last journey seems to have been to Orléans, whither he accompanied the King in 593. He died at Tours, Nov. 17, 594. Gregory's chief work is his *Historiæ Francorum Libri Decem* (Ten Books of Frankish History), the first attempt at French history. The style is crude, and the selection of topics and arrangement indiscriminate. There is a German translation in the *Geschichtschreiber der deutschen Vorzeit* (Berlin, 1887). It has been separately edited by Omont and Colton (Paris, 1887–93). The *Miraculorum Libri Septem* and other minor writings were translated into French by Bordier (Paris, 1857–64). Gregory's complete works are in Migne, *Patrologia Latina*, lxxi; the best edition is that by Arndt and Krusch, in the *Monumenta Germaniæ Historica: Scriptores Rerum Merovingicarum*, vol. i (Hanover, 1885). For his biography, consult Löbell (Leipzig, 1839; 2d ed., 1869); also Bonnet, *Le Latin de Grégoire de Tours* (Paris, 1890).

GREGORY THAU′MATUR′GUS (Gk. Γρηγόριος Θαυματουργός, *Grēgorios Thaumatourgos*, Gregory the Miracle Worker), SAINT (c.210–270). Bishop of Neocæsarea in Pontus, his native city. Sprung from an illustrious and wealthy heathen family, he was educated as a rhetorician; but an acquaintance with Origen at Cæsarea in Palestine in 233 led him to give up the law and apply himself under his new master to the study of the Holy Scriptures and Greek philosophy. When Maximin's persecutions forced Origen to leave Cæsarea, Gregory went to Alexandria and stayed there for a time. Gordian having succeeded Maximin, Origen returned to Cæsarea, and Gregory went thither to renew his studies under him. Most probably it was at that period also that he was baptized, and changed his name from Theodorus to Gregory. Recalled to his family (238), instead of striving for those posts of honor for which he had been destined, he retired into solitude, but was so often besought to return and labor for the Church that he allowed himself to be consecrated Bishop of Neocæsarea about 240. The city was wealthy and populous, but utterly unchristian. Gregory applied himself to his work with the utmost zeal. According to the stories, he wrought many miracles, thereby winning his epithet, the "Miracle Worker." During the persecution of Decius, which broke out in 250, Gregory fled, with a great part of his flock. In 251 the Emperor Decius died, and Gregory returned to Neocæsarea. He now instituted a general festival for those Christians who had fallen during the persecution and permitted the faithful to celebrate it with banquets and sports like those which accompanied heathen festivals—a proceeding by which he intended to draw over the pagan multitude to Christianity, but which has been severely blamed. In 265, with his brother Athenodorus, he was at the Council of Antioch, which had been convoked for the purpose of condemning the heresies of Paul, Bishop of Samosata. Whether Gregory also took part in the second council (270), necessitated by Paul's refusal to abdicate, is very uncertain. He died at Neocæsarea (270). The genuine works of Gregory are a panegyric on Origen, delivered in public before his return to his native place; a creed said to have been revealed by the Virgin Mary; a paraphrase of Ecclesiastes, often and wrongly attributed to Gregory of Nazianzus; and a "Canonical Epistle," setting forth the punishments and penances to be undergone by such Christians as had bought booty from pagan soldiers. The first collected edition of his works was published by Vossius (Mayence, 1604); a more complete edition appeared in Paris (1622). They are in Migne, *Patrologia Græca*, x (Eng. trans. in *The Ante-Nicene Fathers*, vi, Buffalo, 1886–96). Much of our knowledge of Gregory comes from Gregory of Nyssa's life of him (in Migne, *Patrologia Græca*, x). For his life, consult Ryssel (Leipzig, 1880) and Kötschau (Freiburg, 1894).

GRÉGR, grĕ′gr′, EDUARD (1829–1907). A Czech politician, born at Březhrad. He studied medicine, became a lecturer at Prague, and from

1861 was known for his active participation in Austrian political affairs. He assisted in founding the Young Czech party and was acknowledged its foremost spokesman. In 1861 he was elected to the Bohemian Diet and in 1883 a deputy to the Imperial Reichsrat. His programme sought the establishment of an independent Czech state and hence brought him into severe opposition alike to the Old Czech faction, which he denounced for its conservatism, and the Germanizing element.

GRÉGR, Julius (1831–96). A Czech politician, brother of Eduard Grégr, born at Březhrad. He was educated at Prague and became distinguished as a publicist and legislator. For nearly 35 years he was a member of the Bohemian Diet. During his long career in these assemblies he was a prominent representative of the Young Czech party, which he assisted in founding, and vigorously opposed the German influence in Bohemia. Owing to his equally strong opposition to the tactics of the feudalist Old Czech party, he resigned his seat in the Austrian Reichsrat in 1880. The Czech organ, *Národni Listy,* was founded by him, in association with Rieger and Palacky, in 1861.

GREGUSS, grĕ′gōōsh, August (1825–82). An Hungarian critic, born at Eperies. He was a student at the University of Halle, became professor at Szarvas (1846), and finally (1870) professor of æsthetics at the University of Budapest, where he produced a manual of poetics entitled *Magyar Költészettan* (1880). He is particularly known as an analyst and critic of Magyar poetry, and his works are written in that language. Some of them were translated into German by himself (1846) and by Gustav Heinrich (1875).

GREIF, grīf, Martin (adopted name of Friedrich Hermann Frey) (1839–1911). A German poet and dramatist. He was born at Speyer and was educated at Munich. His power of expression, as well as the nobility of thought, depth of sentiment, and simple style, entitles his lyrics in the estimation of many to be ranked among the best modern productions. His dramas are not successful. With the exception of the drama *Hans Sachs* (latest ed., 1894), his numerous productions appear under the name of Martin Greif. Among these are his collected poems, *Gedichte* (1868), *Neue Lieder und Mären* (1902); and dramas, *Nero* (1877), *Marino Falieri* (1879), *Konradin* (1889), *Ludwig der Bayer* (1891)—perhaps his best drama, *Francesca da Rimini* (1892), *Agnes Bernauer* (1894), *General York* (1899), and *Schillers Demetrius* (1901). Consult Kummer, *Deutsche Literaturgeschichte des 19. Jahrhunderts* (Dresden, 1909).

GREIFFENHAGEN, grī′fen-hä′gen, Maurice (?–). An English painter and illustrator. He was born in London and studied there, entering the classes of the Royal Academy at the age of 16. A serious attitude towards the stories he illustrated made him one of the most valuable contributors to the better class of popular magazines. His painting is characterized by strong emphatic line and tapestry-like beauty of color. He exhibited abroad on many occasions, his work being well known in America through its frequent appearance at the Carnegie Institute, Pittsburgh. He received gold medals at Munich (1897) and Dresden (1901). After 1906 he was master of the life class in the schools of the Edinburgh Academy. Important works by him are the "Idyll," in the Liverpool Museum, and the "Judgment of Paris," in the Museum of Sydney, New South Wales. He is also represented in the Carnegie Institute and the Municipal Museum of Ghent, Belgium.

GREIFSWALD, grīfs′vält′. The capital of a district of the same name in the Prussian Province of Pomerania, situated on the navigable river Ryck, 18 miles by rail southeast of Stralsund, near the Baltic Sea (Map: Germany, E 1). It is well built, with modern improvements, and surrounded by promenades laid out on the site of ancient fortifications. There are three mediæval Lutheran churches, of which the Gothic St. Nicholas is the most conspicuous, owing to its high tower and beautiful windows. The town hall is also an interesting old building, and there are a number of curious private houses—gabled brick structures dating from the fourteenth and fifteenth centuries. The University of Greifswald was founded in 1456. It has four faculties—theology, law, medicine, and philosophy—with an attendance in 1913 of 1554 students, and a library of 241,000 volumes (1913), besides a number of interesting manuscripts. It has an art collection, a display of antiquities dating from before Christ, a botanical garden, and a zoölogical museum. At the university is shown every tenth year the valuable Croy tapestry, belonging to the sixteenth century and representing Luther preaching. The town has also a Gymnasium, a dairy school, and a geographical and scientific museum. The chief manufacturing establishments are the royal railway shops, machine works, foundries, electrical works, chicory factories, and shipbuilding yards; chains and monuments are also made. Fisheries and the herring-salting industry are important. Sugar of lead, dried fish, and fruit preserves are exported, but the trade is principally in grain and wood. Pop., 1900, 22,950; 1910, 24,679.

Greifswald received its municipal rights in the thirteenth century and became in the same century a member of the Hanseatic League. It suffered greatly from frequent sieges, but regained its prosperity under the dominion of Sweden, into whose hands it fell in 1631. It became Prussian in 1815.

GREIN, grīn, Christian Wilhelm Michael (1825–77). A German philologist. He was born at Willingshausen, Hesse, was educated at Marburg and Jena, and in 1865 became archivist to the Elector of Hesse at Cassel. In 1873 he was elected professor at Marburg and in 1877 archivist at Hanover, where he died. Besides several valuable translations of Anglo-Saxon poems, he published the work entitled *Bibliothek der angelsächsischen Poesie in kritisch bearbeiteten Texten, mit Glossar* (4 vols., 1857–64), a work of basic importance on Anglo-Saxon literature, and the first which may be regarded as a compilation of the various editions of the poems discussed. In collaboration with Holthausen he published the *Sprachschatz der angelsächsischen Dichter* (2 vols., 1861–64), of which a new edition has recently been edited by Köhler (Heidelberg, 1912–13). Unfortunately Grein did not live to complete his work on Anglo-Saxon prose, entitled *Bibliothek der angelsächsischen Prosa* (1872), which has been continued by Wülker and others, vols. ii–v (1885–1900).

GREIZ, grīts. The capital of the German Principality of Reuss (Elder Branch), situated on both banks of the White Elster, 49 miles south of Leipzig (Map: Germany, E 3). The picturesque old town is on the right bank, the new town on the left. It has an old castle situated on a rock above the town, also the residence of the Prince of Reuss, and a fine Gothic Rathaus, built in 1841. The summer residence of the Prince stands in a beautiful valley which has been converted into a park surrounded by wooded mountains. The town has a Gymnasium, a Realgymnasium, a textile school, and a seminary. It owns its water works, a gas and an electric plant, and a savings bank. Greiz is the seat of a highly developed textile industry employing in the neighborhood of 10,000 people. The chief manufactures are dress goods, woolens, shawls, quilts, dyestuffs, leather, cigars, paper, castings, and machinery. Pop., 1900, 22,346; 1910, 23,245, nearly all Protestants.

GRELL, grĕl, Eduard August (1800–86). A German organist, born in Berlin. He was the pupil of Kaufmann, Ritschl, and Zelter. He entered the Singakademie in 1817 and was director of it for 20 years. He was court organist and teacher of the cathedral choir and teacher of composition at the academy. His compositions are vocal and usually sacred. Among them are an oratorio, *Die Israeliten in der Wüste;* a mass in 16 parts, which has been given repeatedly in Europe and the United States; a four-part arrangement of the choral melodies of the Evangelical *Gesangbuch;* organ preludes, motets, cantatas, and hymns. Consult H. Bellermann, *Eduard August Grell* (Berlin, 1899).

GRELLET′, Stephen (originally Etienne de Grellet de Mabillier) (1773–1855). A Quaker missionary and philanthropist, born in Limoges, France, of a wealthy and noble family. He was originally a Roman Catholic and was educated at the military college at Lyons. At the time of the Revolution he belonged to the bodyguard of Louis XVI. After the execution of the King he escaped and came to America. In 1795 he joined the Society of Friends. During the yellow-fever epidemic in Philadelphia, in 1798, he was untiring in his attentions to the sick and the dying. A little later he engaged successfully in business in New York and after 1800 traveled as a missionary over much of the United States and Canada and made two missionary tours in Europe, personally addressing the Czar and the Pope, who is said to have heard him kindly, on the subject of religion. He died in Burlington, N. J. Consult Seebohm (ed.), *The Life and Gospel Labours of Stephen Grellet* (3d ed., London, 1862).

GREMIAL (grē′mĭ-*a*l) **VEIL.** See Costume, Ecclesiastical.

GRENADA, grē-nä′dȧ. The smallest and most southerly of the three (British) Windward Islands colonies, consisting principally of the island of Grenada, which is situated 68 miles south-southwest of St. Vincent and about 90 miles north of Trinidad (Map: West Indies, G 4). The Grenadines are included partly in the Colony of St. Vincent and partly in the Colony of Grenada. The latter has a land area of 133 square miles; the island of Grenada occupies about 119 square miles and the attached Grenadines about 14 square miles, almost all of which is comprised in the island of Carriacou. The island of Grenada is of volcanic origin and contains several craters, now extinct; it abounds in streams and in mineral and other springs. Grenada is mountainous and picturesque. The highest point is Mount St. Catherine (2749 feet); Mount Sinai is 2300 feet high. Remarkable natural curiosities are the lakes Antoine and Grand Etang, each situated on a mountain; the former is in the northern part of the island, and the latter, at an elevation of 1740 feet, about 6 miles from St. George's, the capital. The climate is healthful and, during the dry season, delightful. The average annual rainfall at St. George's is 77.6 inches, but in other parts of the island it is much greater; at the Grand Etang in 1910 it was nearly 187 inches. In recent years the highest temperature at St. George's is reported at 87°, and the lowest at 67.8°, the average mean temperature being 78.8°. The chief occupation of the people is agriculture, and the area under cultivation exceeds 30,000 acres. Formerly the cultivation of sugar cane was the principal industry, but it has been almost wholly superseded by cacao culture. The cultivation of nutmegs and other spices is important. Cotton culture has declined in Grenada, but remains the chief industry of Carriacou. Some sugar cane is still grown and is used chiefly for the production of rum. In 1912 the colony's export of cacao amounted to 101,043 hundredweight; nutmegs, 12,215; other spices, 2392; cotton, 3395; cottonseed, 9567. In 1902 imports and exports were valued at £239,103 and £310,602 respectively; in 1911, £309,227 and £264,640 (imports from the United Kingdom, £142,017, and exports thereto, £172,001). The administration of the island is vested in the Governor of the Windward Islands and in a legislative council of 13 members, consisting of six official and seven unofficial members appointed by the crown for six years. Revenue and expenditure increased from £72,802 and £68,669 respectively in 1902–03 to £98,645 and £81,012 in 1911–12; public debt (1912), £123,670. The capital, St. George's, the headquarters of the government of the Windward Islands, situated on a strongly fortified bay on the southwest coast, has a fine harbor, capable of accommodating the largest vessels, and is an Imperial coaling station. The population of the colony, as returned by the several censuses, has been as follows: 1844, 29,650; 1851, 32,671; 1861, 31,900 (the decrease was due to the cholera epidemic of 1854); 1871, 37,684; 1881, 42,403; 1891, 53,209; 1901, 63,438; 1911, 66,750. The population of Carriacou, included above, was 6497 in 1901 and 6886 in 1911. The inhabitants are mostly colored, only about 2 per cent being white. The average birth rate in the 10 years ended 1907 was 41.09, and death rate 21.49; in 1911, 37.88 and 18.65. In 1912 there were 51 government and government-aided elementary schools, with 10,372 pupils; the average attendance was only 5261. English is spoken, but among themselves the people speak a French patois. The chief town is the picturesque port, St. George's (pop., 4916); other towns are Gouyave, or Charlotte Town (about 2500), Grenville, or La Baye, next in importance to St. George's (about 1500), Sauteurs, Victoria, and, in Carriacou, Hillsborough. Grenada was discovered by Columbus, Aug. 15, 1498, and was settled by the French in 1650–51. In 1762 Grenada was captured by the British, from whom it was retaken by the French in 1779, but restored in 1783. Consult *The Grenada Handbook* (London, annually).

GRENADA. A city and the county seat of Grenada Co., Miss., 100 miles south of Memphis, Tenn., on the Illinois Central and the Yazoo and Mississippi Valley railroads (Map: Mississippi, F 3). It is the seat of Grenada College (female). There are cottonseed-oil mills and a brick plant. Settled about 1840, the city is governed by a mayor, elected biennially, and a city council. The city owns the water works and electric-light plant. Pop., 1900, 2568; 1910, 2814.

GRENADE′ (Fr. *grenade*, from Sp., Portug. *granada*, grenade, pomegranate, from Lat. *granatus*, filled with grains, from *granum*, seed). A small explosive shell, thrown from the hand. They were formerly in general military use and were regarded as being particularly effective when thrown among troops making an assault. They were largely used at Port Arthur (1904–05) by both the Japanese and Russians. They were found so effective that there developed an increased interest in the invention and adoption of improved hand and rifle grenades. The latter are projected several hundred feet by the use of the rifle employing a cartridge with reduced charge. Grenades for use with air craft also have been developed. See Military Aëronautics.

GRENADIER, grĕn′*a*-dēr′. Originally a soldier detailed and equipped for throwing hand grenades. They were tall men, selected because of special qualifications for the purpose; afterward separate companies of grenadiers were formed, in France about 1670 and in England soon afterward. The flank company or companies of every infantry regiment, because of their superior height, were known as grenadier companies. The grenadier regiments of modern European armies belong in every instance to royal household troops or select guard corps. See Grenade.

GRENADIER. A book name for a large family of pelagic fishes, Macruridæ, allied to the cods, which inhabit the deep parts of the ocean and often present extraordinary shapes. They are frequently called onion fishes by the fishermen, or popeyes, on account of the size and shape of their eyes, which are large and prominent, as is usual among deep-sea animals. They occur frequently in the western Atlantic, and sometimes in forms that are edible. They are known to fishermen through their proclivity for stealing bait and making off with trawl-line hooks. The species best known to the fisherman and the largest is *Macrurus rupestris*, called rat-tail fish as well as onion fish. This form abounds off the north Atlantic coast and reaches a length of 3 feet and a weight of four or five pounds. Prominent genera are *Bathygadus, Steindachneria, Chalinura, Corpyhænoides, Hymenocephalus, Macrurus, Cœlorhynchus,* and *Lionurus.* See Plate of Codfish and Allies.

GRENADIER GUARDS. Certain regiments of foot guards in European armies. In England the regiment of Grenadier Guards consists of the first, second, and third battalions and takes seniority of all other infantry regiments. It was organized in 1660 as the First Foot Guards. See Grenade; Grenadier.

GRENADIERS, The (Ger. *Die Grenadiere*). A famous poem by Heine, celebrating the devotion of Napoleon's soldiers.

GRENADINES, grĕn′å-dēnz′. A chain of islets belonging to the Windward group of the West Indies, situated between Grenada and St. Vincent (Map: West Indies, G 4). They number about 30 and cover an area of 20 square miles, but only three are inhabited, viz., Carriacou, Petit Martinique, and Isle de Rhonde. The two former are connected administratively, forming a dependency of Grenada, with a population of 6497 in 1901 and 6886 in 1911.

GRENELLE, gre-nĕl′. A southwestern quarter of Paris, on the left bank of the Seine. It is an important junction on the Circular Railway, with branches to the Champ de Mars and to Les Moulineaux, and has many manufactures.

GREN′FELL, Bernard Pyne (1869–). An English classical scholar, born in Birmingham. He was educated at Clifton College, where his father was a master, and at Queen's College, Oxford, of which he became a fellow in 1894. For his important work (mostly with A. S. Hunt) in Egypt, discovering and editing important texts on papyrus, he received honorary degrees from Graz, Dublin, and Königsberg, and in 1908 was made professor of papyrology at Oxford. Hunt and Grenfell's great finds were at Oxyrhynchus (Behnesa) in 1896–97 and in 1905 and the years following, and included the *Logia* of Jesus, parts of Menander's *Colax* and *Perinthia*, and fragments of Callimachus' *Ætia* and of Sophocles' satyr play, the *Ichneutæ*. With Hunt he edited *The Oxyrhynchus Papyri* (9 vols., 1897–1912); *Menander's Georgos* (1898); *The Amherst Papyri* (1900–01); *The Tebtunis Papyri* (1902, 1906), excavations for the University of California; the *Hibeh Papyri* (1906); and, with Hunt and Hogarth, *Fayûm Towns and their Papyri* (1900).

GREN′FELL, Francis Wallace, first Baron Kilvey (1841–). An English soldier, born in London. He entered the Sixtieth Rifles in 1869 and was commissioned captain in 1871 and major in 1878, during which year he served in the Kaffir War as deputy assistant adjutant and quartermaster-general at headquarters. In the Boer War of 1881 he was assistant quartermaster-general under the command of Sir Evelyn Wood. During the Egyptian War of 1882 he was assistant adjutant and quartermaster-general on the headquarters staff and fought at Tell-el-Kebir; was sirdar of the Egyptian army from 1885 to 1892 and directed the operations near Suakim in 1889. From 1894 to 1897 he was at the War Office as inspector general of auxiliary forces and in 1897–98 commanded in Egypt. He was Governor-General and commander in chief of Malta in 1899–1903, was in command of the Fourth Army Corps in 1903–04, and was made a field marshal in 1908.

GRENFELL, George (1849–1906). An English missionary and explorer, born at Sancreed, near Penzance, Cornwall. In 1875 he went as a Baptist missionary to Cameroon, West Africa, with Alfred Saker (1814–80), and thereafter did some exceedingly important work in exploring little-known rivers of the Congo Basin. In 1877 he removed to Victoria and explored the Wuri River and in the following year he ascended Mongo ma Loba Mountain. In 1881, coöperating with the Rev. T. J. Comber and others, he established a chain of missions at Musuko, Vivi, Isangila, Manyanga, and other points, and in 1884, in a small steam vessel, he explored the Congo to the equator. He established headquarters at Arthington, near Leopoldville, in 1884, and launched on Stanley Pool a river steam vessel, the *Peace*, in which he explored the Kiva, the Kiwango, and the

Kaisai rivers, discovered the Ruki, or Black, River, and ascended the Mubangi for 200 miles to Grenfell Falls, at lat. 4° 40′ N. In 1885 he explored other tributaries of the Congo, notably the Busira, along which he found the dwarf tribes of the Batwa. In the following year he examined the Kasai, the Sankuru, and the Luebo and Lulua, and made careful records of the Bakuba and Bakete tribes. He was awarded the medal of the Royal Geographical Society for his map of the Congo Basin. In 1891 he was appointed a plenipotentiary for Belgium to delimit the boundary line between the Belgian and Portuguese possessions along the Lunda frontier. He protested to King Leopold against Belgian maladministration in the Congo Free State, but with little effect. Consult: Johnston, *George Grenfell and the Congo* (2 vols., London, 1908); Hawker, *Life of George Grenfell* (ib., 1909); Dickins, *Grenfell of the Congo* (ib., 1910).

GRENFELL, Helen Loring (?–). An American educator and penologist. She was born at Valparaiso, Chile, and was educated at the State Normal College, Albany, N. Y., and at the University of Denver (M.A., 1904). She was married to Edwin I. Grenfell in 1889. She was three times elected superintendent of the schools of Gilpin Co., Colo. While State superintendent of public instruction (three terms) from 1899 to 1905, she greatly increased the school revenues by leasing the State lands and also revised and annotated the school laws. From 1909 to 1914 she was commissioner of the State Penitentiary and Reformatory, thus having full control of the penal institutions of the State. Mrs. Grenfell was the only woman who had ever been intrusted with the duties of such an office when she took up the work in 1909. She became vice president of the Colorado Equal Suffrage Association.

GRENFELL, Wilfred Thomason (1865–). An English missionary physician. He graduated at Oxford University and later studied at the London Hospital, Whitechapel. A daring and skillful sailor, he became interested in reform work among the mariners of the North Sea; for them he established homes on land and arranged mission vessels at sea. In 1892 he began his work in Labrador, cruising along the coast in a sailing vessel fitted out as a hospital. Through his efforts were built four hospitals, a series of coöperative stores, mills, an orphanage, and a school. His inadequate sailing hospital was replaced by a steamship in 1895, and in 1897 by the *Strathcona*, a well-equipped steel steam vessel, the gift of Lord Strathcona. In 1912 Grenfell opened in St. John's, Newfoundland, the King George the Fifth Seaman's Institute. From the first he emphasized the bettering of physical and economic conditions as the necessary introduction to evangelistic work. His books include: *Off the Rocks* (1906), stories; *Adrift on an Icepan* (1909); *Labrador, the Country and the People* (1909; new, enlarged ed., 1913), with others; *Down to the Sea* (1910), stories; *Down North on the Labrador* (1911); *The Adventures of Life* (1912), the W. B. Noble lectures for 1911. Consult: Duncan, *Dr. Grenfell's Parish* (New York, 1905); Johnston, *Grenfell of Labrador* (London, 1908); Gilliat, *Heroes of Modern Crusades* (Philadelphia, 1909); C. Lee, *With Dr. Grenfell in Labrador* (New York, 1914).

GRENOBLE, gre-nō′bl′ (Lat. *Gratianopolis*, city of Gratian). The capital of the Department of Isère, France, and a fortress of the first class, in the valley of the Isère, 81 miles from Lyons by rail (Map: France, S., K 3). It is surrounded by high mountains and divided by the river, which is confined within handsome quays, into two unequal portions; the ancient quarter on the right bank is small and uninteresting; above it are the fortresses Rabot and La Bastille; while the modern portion on the opposite bank has a number of fine streets and squares. Among the chief public buildings are the Palais de Justice, in Renaissance style; the cathedral of Notre Dame, dating from the twelfth century; and the museum with an extensive gallery of ancient and modern paintings and a library of over 400,000 volumes and 10,000 pamphlets and college theses, one of the finest in France. The University of Grenoble, founded in 1339, has three faculties, a library of 72,000 volumes, and had, in 1913, 1746 students; there are also a school of medicine, an electrical institute, an artillery institute, trade schools, a theological seminary, and military and art schools. The chief industrial products are gloves (this product alone employing 18,000 persons), leather, dyestuffs, straw hats, metal ware, silk, liquors, and cement. It carries on a good trade in grain, wood, and cheese. Pop., 1911, 77,438. Grenoble, originally the Cularo of the Allobroges, was fortified by Gratian in the fourth century and became Burgundian in the following century. Later it was the capital of Dauphiné until 1453.

GREN′VILLE, George (1712–70). An English statesman, brother of Richard Grenville, Lord Temple, and brother-in-law of the first Earl of Chatham. Educated at Eton and at Christ Church College, Oxford, and admitted to the bar in 1735, he abandoned the law to enter Parliament in 1741 and from 1744 to 1762 filled various government offices. In 1758 he secured the passage of a bill for the regulation of the payment of the navy; four years later he became Secretary of State for the Northern Department, and in the following year he succeeded Lord Bute as Prime Minister, uniting in himself the offices of Chancellor of the Exchequer and First Lord of the Treasury. He is best known from his connection with the Stamp Act and the famous Wilkes case. He advocated the passage of the Stamp Act and opposed its repeal. He was forced in 1765 to resign the premiership and died five years later without again holding important office. Grenville was distinguished for eloquence, public spirit, business qualities, and extensive knowledge. For accounts of his life, consult: *The Grenville Papers* (London, 1852–53); Chatham, *Correspondence* (ib., 1838–40); Walpole, *Memoirs of the Reign of George II* (ib., 1847); id., *Memoirs of the Reign of George III* (ib., 1859); Lecky, *History of England* (New York, 1891); Macaulay, *Essays* (ib., 1860).

GRENVILLE, George, Viscount Lansdowne. See Lansdowne.

GRENVILLE, or **GREYNVILLE,** Sir Richard (?1541–91). An English naval officer. As a young man, he served with distinction against the Turks, under the Emperor Maximilian II. Upon returning to England he became interested in the exploration of the New World, and in 1585 commanded a fleet of seven ships, which under the patronage of his cousin, Sir Walter Raleigh, sailed to Virginia for exploration and plunder. He left a colony on Roanoke Island and on his return voyage captured a rich prize. He carried fresh supplies to Roanoke the year following, but found the settlement abandoned, the people having returned to England with Sir Francis Drake. During the homeward trip he landed at the Azores, where he pillaged towns and carried off prisoners. In 1591, as second in command, on the *Revenge*, he accompanied Lord Thomas Howard to the Azores to intercept the treasure fleet of Spain. The English were surprised the last day of August by a powerful Spanish armada, and for some obscure cause the *Revenge* was delayed until the Spaniards got to windward of her and cut her off from the rest of the squadron. Grenville attempted to break through the Spanish line and was overpowered and captured, after 15 hours of desperate fighting with 150 men against 15 Spanish ships and 5000 men. Grenville was mortally wounded and died a few days afterward. The fight is commemorated in Tennyson's "Revenge, a Ballad of the Fleet." Consult Arber, "Last Fight of the *Revenge* at Sea," in *English Reprints*, vol. xiv (London, 1871). The narratives of Grenville's voyages are in Hakluyt, *Voyages*, vols. ii and iii (ib., 1809–12; Edinburgh, 1889–90).

GRENVILLE, RICHARD TEMPLE. See TEMPLE, EARL.

GRENVILLE, WILLIAM WYNDHAM, LORD (1759–1834). An English statesman, the youngest son of George Grenville (q.v.). He was born on Oct. 25, 1759. After studying at Eton and at Christ Church, Oxford, with brilliant success, he studied law at Lincoln's Inn, but did not enter the profession. He became a member of the House of Commons in 1782 and attended his eldest brother, Lord Lieutenant of Ireland, in the character of secretary. In 1783 he became paymaster-general of the army. In 1787 his cousin, William Pitt, sent him on a diplomatic mission to Holland, where he was largely instrumental in preparing for the Triple Alliance of 1788. In 1789 he was chosen Speaker of the House of Commons, but resigned the same year to become Secretary of State for the Home Department, and the year following he was raised to the peerage with the title of Baron Grenville. In 1791 Pitt made him Foreign Secretary, a post which he held until 1801, when he resigned along with his chief, on the refusal of George III to give his assent to the Catholic Emancipation Bill. He was Premier of the "All the Talents Ministry" (q.v.) in 1806–07, the chief act of which was the abolition of the slave trade. In 1809 he was chosen chancellor of the University of Oxford. From 1815 he acted along with Earl Grey and generally supported Mr. Canning. He died at Dropmore, Buckinghamshire, Jan. 12, 1834. Grenville was the author of an *Essay on the Supposed Advantages of a Sinking Fund* (London, 1828). Consult Adams, *The Influence of Grenville on Pitt's Foreign Policy* (Washington, 1904).

GRESH'AM, SIR THOMAS (1519–79). An English merchant and financier. He was educated at Gonville Hall, Cambridge, was apprenticed to his uncle, Sir John Gresham, merchant, and was admitted to membership in the Mercers Company (1543). In 1551 he became King's factor at Antwerp, in which office it was his business to negotiate royal loans with Flemish merchants, to buy arms and military stores, and to divert to England as much bullion as possible. As a result of his skillful management of the finances, the rate of exchange, which had been very unfavorable to England, was much improved. Since he was a Protestant, he was dismissed upon Mary's accession to the throne; but he had proved himself indispensable and was quickly reinstated. Elizabeth's successful financial policy owed much to his shrewd advice. At his suggestion the debased currency was restored, and later, when the troubles in Antwerp curtailed foreign resources, he persuaded her to secure a forced loan from the merchant adventurers and staplers by the detention of their fleets. In 1554 he was sent to Spain to procure bullion, and in 1559 he was employed as Ambassador to the Duchess of Parma, Regent of the Netherlands. On this occasion he was knighted. He also carried on an extensive private business as banker, goldsmith, and mercer, and was held to be the wealthiest merchant of his time. He possessed much landed property and established the earliest paper mills in England. He applied his wealth to public uses, after the death of his only son, in 1564. He founded a bourse in London, in imitation of the one at Antwerp, and named it the Royal Exchange. He also founded Gresham College (London) and eight almshouses. Consult Burgon, *Life and Times of Sir Thomas Gresham* (London, 1839). See GRESHAM'S LAW.

GRESH'AM, WALTER QUINTON (1832–95). An American jurist and politician, born near Lanesville, Harrison Co., Ind., March 17, 1832. He was educated at the Indiana State University, but left before completing the course and, after studying law at Corydon, Ind., was admitted to the bar in 1853. He stumped the State of Indiana for Frémont in the campaign of 1856 and in 1860 was elected as a Republican to the State Legislature. In 1861 he enlisted as a private in the Thirty-eighth Indiana Volunteers, but was chosen lieutenant colonel of the regiment before it left the State. In December, 1861, he was commissioned colonel of the Fifty-third Indiana Volunteers and commanded it at Shiloh, at Corinth, and in the Vicksburg campaign. For bravery at the siege of Vicksburg he was promoted to be brigadier general in August, 1863. He commanded the Fourth Division of the Seventeenth Army Corps of Sherman's army at the beginning of the march to the sea; but at Leggett's Hill, near Atlanta, was so severely wounded in the knee as to be compelled to retire from active service. In March, 1865, he was brevetted major general for gallantry before Atlanta. After the war he resumed his law practice at New Albany, Ind., and in 1866 was an unsuccessful Republican candidate for Congress. After spending the greater part of the next two years in New York City as financial agent for his native State, he was appointed in 1869 by President Grant United States district judge for Indiana. In 1880 he was an unsuccessful candidate for the United States Senate. In 1882 he resigned his seat on the bench in order to accept President Arthur's tender of the office of Postmaster-General, made vacant by the death of Timothy O. Howe, and it was largely upon his recommendation that Congress passed the Act excluding all lottery matter from the United States mails. In 1884 he was made Secretary of the Treasury, a position which he held for a few months, when he was appointed United States judge for the seventh judicial district, and in 1886 attracted national attention by his adjudication of the Wabash Railroad case, particularly by ordering the removal of Jay Gould's receiver and appointing in his place Judge Thomas M. Cooley. He was a candidate for the Republican nomination for President in 1884 and 1888. Later he found himself out of sympathy with his party on the tariff question, having always been a low-tariff Republican. Several of his judicial decisions had won for him the support of the Populists, and had he consented he could have been nominated for the presidency at the national convention of that party held at Omaha, Neb., in July, 1892. He refused to allow his name to be considered, however, and soon after issued a public statement declaring his purpose to support Grover Cleveland's candidacy. After his election President Cleveland named Judge Gresham Secretary of State, a post he held until his death, on May 28, 1895.

GRESHAM'S LAW. A principal of political economy formulated by Sir Thomas Gresham (q.v.) to the effect that in a monetary circulation bad money drives out good. It was originally applied to the effect upon the circulation of mutilated, worn, or depreciated coinage. If into such a coinage new, full-weight coins be injected, it will not be long before the latter are exported or find their way to the melting pot, while the worn-out coins still continue to fulfill their function as money. The reason for this lies in the higher bullion value of the new coin. For exportation or industrial uses the value of the coin is determined by the weight. It is therefore the best coins which are sought for this purpose, and it is a familiar experience that the export of coin works towards the deterioration of the coinage. In latter days Gresham's law has been applied to concurrent circulation of different types of money—gold, silver, and paper. Under the joint circulation of gold and silver, that which in the currency of the country is the cheapest as compared with the valuations of other countries, and the world's market, will tend to displace the other metal. In like manner the infusion into the circulation of irredeemable paper money promotes exportation of metallic money. Gresham's law, in the familiar form that bad money drives out good, of course applies absolutely only where there is a redundancy of currency. In such a case there is a natural movement towards the exportation of money, and that metal will be chosen for exportation which is of least value at home. Unless such redundancy exists, gold and silver may and do circulate side by side despite the fact that legal ratios do not conform to the general market, or, in other words, that in the sense of the maxim one is good and the other bad. See BIMETALLISM; MONEY.

GRESSET, grĕs′sȧ′, JEAN BAPTISTE LOUIS (1709–77). A French poet and playwright, born at Amiens. At 16 he became a Jesuit and later taught in Jesuit colleges. *Vert-Vert*, the delightful tale of an indiscreet parrot, appeared at Rouen in 1734 and soon went the rounds of Europe. His *Chartreuse*, *Carême impromptu*, *Lutrin vivant* soon afterward dismayed the Jesuits. Gresset was sent off to La Flèche and shut out of the company. In 1740 he was in Paris, and there he had played his *Edouard III*, a tragedy, a comedy called *Sydney* (1745), and *Le Méchant* (1747), which was then a success and is to-day considered one of the best comedies of the eighteenth century. Famous in Paris, where he became an Academician in 1748, Gresset went to Amiens, and founded an academy in 1750. In 1759 we find him forswearing the theatre, even indulging in a little severity to placate his brethren whom he had scandalized by his satire on selfish court prelates. Gresset's works appeared in three volumes in 1811 and again in 1859. *Vert-Vert* and other pieces were Englished by "an officer of the army" (New York, 1801) in the *Select Translations and Imitations from the French of Marmontel and Gresset.* Consult also: Dérome, *Poésies choisies*, with bibliography and biography (Paris, 1883); Daire, *Vie de Gresset* (ib., 1779); Robespierre, *Eloge de Gresset* (London, 1785); Bailly, *Eloge de Gresset* (Geneva, 1785); Saint-Albin Berville, *Gresset, sa vie et ses œuvres* (ib., 1863); E. Voguë, *Gresset* (Paris, 1894).

GRESS′MANN, HUGO (1877–). A German Old Testament scholar, born in Mölln, Holstein. He was educated at Greifswald, Göttingen (Ph.D., 1899), Marburg, and Kiel, taught at Kiel, and in 1907, after a few months in Jerusalem, became professor in Berlin. He wrote: *Studien zu Eusebs Theophanie* (1903); *Der Ursprung der israelitisch-jüdischen Eschatologie* (1905); two valuable works on archæology and excavations in Palestine, *Ausgrabungen in Palästina und das Alte Testament* (1908) and *Palästinas Erdgeruch in der israelitischen Religion* (1909); *Altorientalische Texte und Bilder zum Alten Testamente* (1909); *Das Gilgamesch-Epos erklärt* (1911); *Mose und seine Zeit* (1913).

GRETA (grē′tȧ) **HALL.** The residence of the poet Southey from 1803 to his death. It is situated in the Vale of Keswick, Cumberland.

GRETCH, grĕch, NIKOLÀI IVÀNOVITCH (1787–1867). A Russian author, born in St. Petersburg, of a Bohemian family. He studied law, but later devoted himself to literature. From 1809 to 1813 he was professor of Russian literature in the school of St. Peter and for three years more in a Russian Gymnasium. He traveled in Germany and France, and in 1829 became connected with the Ministry of the Interior. Transferred to the Department of Finance, he traveled in England, France, and Germany, studying the subject there. His rapid political advancement was due to his conservative politics. His literary fame dates from 1812, when he became editor of the periodical called *Syn Otečestva* (The Son of the Fatherland), a position he held for 26 years. From 1825 to 1860 he edited also (with Bulgarin, q.v.) another Russian periodical, *Sěvernaia Pčela* (The Northern Bee). Both of these publications greatly affected Russian politics and literature, especially between 1830 and 1840. But his books are better known than either his political or his journalistic work. He wrote a handbook of Russian literature (1819–22), a work on Russian grammar (2d ed., 1830), two novels, two books of travel, and posthumous memoirs (1886). His complete works were published at St. Petersburg in 1855 in three volumes. Gretch's sketch of Russian literature, translated into German, is included in Otto, *Lehrbuch der russischen Litteratur* (Leipzig, 1837). Consult also K. Waliszewski, *History* *of Russian Literature* (New York, 1900), and A. Brückner, *The Literary History of Russia* (ib., 1908).

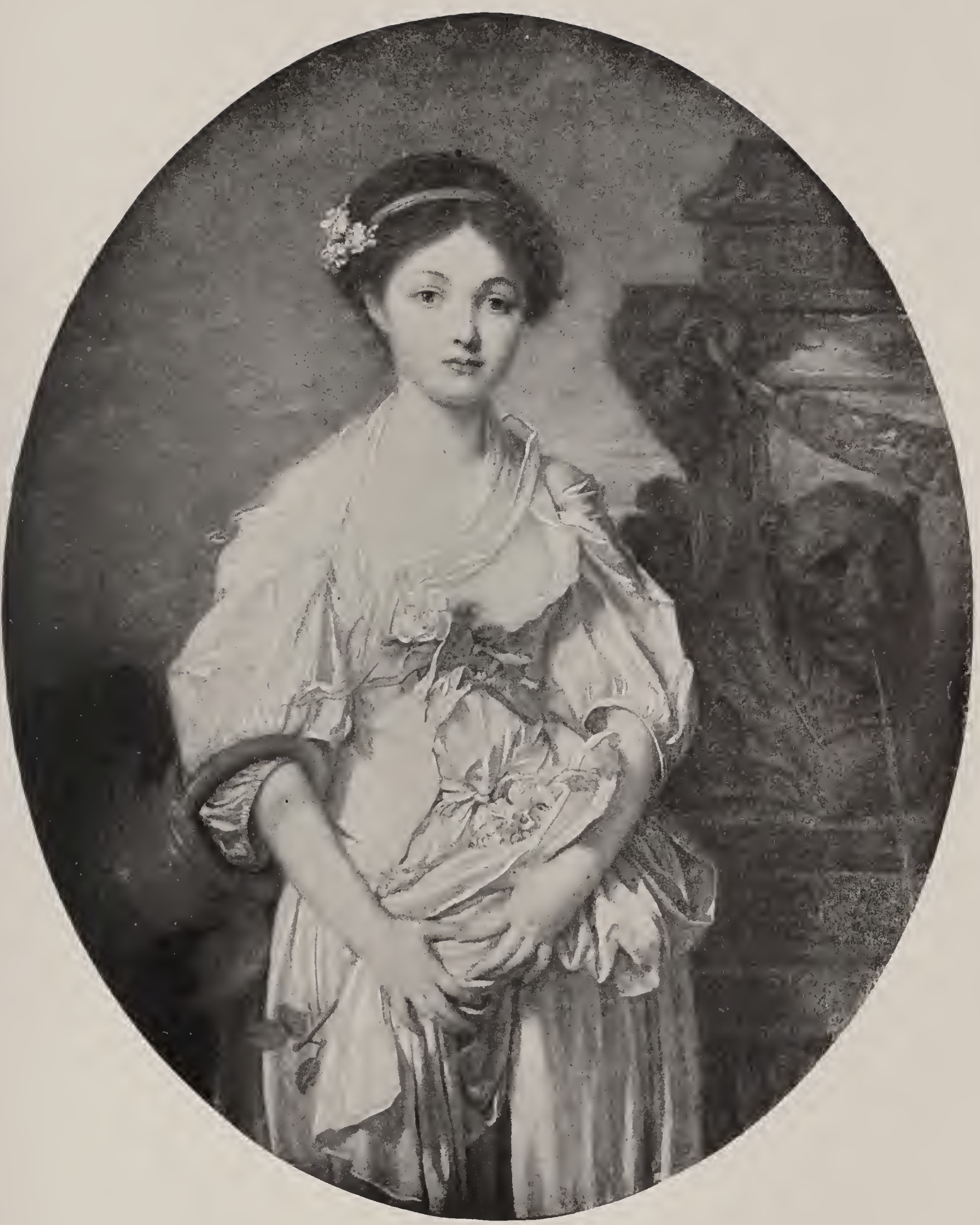
GRETCH'EN. The heroine of Goethe's *Faust*, a simple, confiding girl of the people, who gives her love to the title character.

GRET'NA. The parish seat of Jefferson Parish, La., on the Mississippi River, opposite New Orleans, with which it is connected by ferry, and on Morgan's Louisiana and Texas, the Texas and Pacific, and the New Orleans, Southern, and Grand Isle railroads (Map: Louisiana, J 7). There are a Catholic college for boys and a fine courthouse here. It is engaged extensively in the manufacture of cottonseed oil, lard and soap, barrels, and fertilizers. Gretna was founded in 1835 and on several occasions, particularly in 1880 and 1891, suffered from breaks in the levee. Pop., 1900, 3969; 1914 (local est.), 7000.

GRETNA GREEN. A village of Dumfriesshire, Scotland (near the Solway and just over the border from England), which gained great notoriety as the favorite place for runaway couples from England to celebrate marriages and so easily evade the English Marriage Act, which required the consent of parents and guardians, publication of banns, and the presence of a priest. The law of Scotland required nothing but a mutual declaration of intention to be exchanged in presence of witnesses—a ceremony which could be performed instantly; and it was immaterial whether the parties were minors or not. This declaration generally took place in presence of a blacksmith, who in reality was no more necessary than any other witness, but who gradually assumed an authority which imposed on the credulity of the English strangers, and profited by the liberality usually dispensed on such auspicious occasions for his trifling services. The declaration of marriage being exchanged, the parties could return at once to England, and their marriage was held valid there and the world over, under the rule of law that the validity of a marriage is governed by the law of the place where it is contracted (*lex loci contractus*). The severity of the English marriage law has been modified; the Scottish law has been altered, with a view of checking this evasion of English law; and, since 1856, by 19 and 20 Vict., c. 96, no irregular marriage of that kind in Scotland is now valid unless one of the parties had at the date thereof his or her usual place of residence there, or had lived in Scotland for 21 days next preceding such marriage. See MARRIAGE.

GRÉTRY, grā'trā', ANDRÉ ERNEST MODESTE (1741–1813). A once celebrated French dramatic composer, born at Liége. His earliest musical experience was as a chorister in a local church, but, as it proved unsatisfactory, he was placed under private teachers. About this time he first heard an operatic performance, which strongly incited him to the study of harmony and counterpoint on his own account. He was, however, a poor student, and so impatient to create that at 17 years of age he had produced six symphonies, and in 1759 wrote a mass which so interested an influential Church dignitary as to gain for its composer the means to study in Rome, where for five years he studied at the Collège de Liége. Here the same characteristics that had previously marred his educational progress prevented any real advancement in the broader field of musical art, and, following his own inclinations, he turned towards dramatic music, his first venture, an intermezzo, *La vendemmiatrice* (1765), being well received. After staying in Rome nine years, he went to Geneva on a fruitless mission to secure a libretto from Voltaire. Acting on the latter's advice, he made his way to Paris, where, after two years of hardship, he succeeded in obtaining the patronage of Count Creutz, the Swedish Minister, who secured him Marmontel's *Le Huron* (1768), for which he wrote the music, and through which he rose to fame. Nearly everything he wrote subsequently was enthusiastically received, notwithstanding a great many musical defects, and the overshadowing of his work by the greater genius of Méhul and Cherubini. However, his influence on the development of *opéra comique* was lasting, Boieldieu, Adam, and Auber continuing on the principles laid down by Grétry. In his *Mémoires*, published in 1789, he clearly stated his conviction regarding dramatic composition. In general his views coincide with those of Gluck (q.v.), but in subordinating mere singing to the dramatic requirements he is even more radical than the great reformer. He wrote about 50 operas and much dramatic music, piano sonatas, instrumental numbers, masses, and Church music generally, most of which were published, and enjoyed more or less popularity. Breitkopf and Härtel commenced in 1883 a complete edition of his works, of which 39 volumes had been published up to 1915. Consult: A. J. Grétry, *Grétry en famille* (Paris, 1815); M. Brenet, *Grétry, sa vie et ses œuvres* (ib., 1884); H. de Curzon, *Grétry* (ib., 1907); R. Rolland, *Musiciens d'autrefois* (ib., 1912).

GREUZE, grẽz, JEAN BAPTISTE (1725–1805). A French genre and portrait painter, one of the most eminent of the eighteenth century. He was born at Tournus in Burgundy, Aug. 21, 1725, the son of a tiler. The lad's talent for drawing induced his father, who wished him to become an architect, to follow the advice of the Lyonnese painter Grandon, who taught him at Lyons and took him to Paris. There Greuze studied in the schools of the Academy and attracted attention by his first picture, "A Father Explaining the Bible to his Children," so novel in theme and of such excellence that its authorship by so young a painter was not believed. It was, however, followed by others. His succeeding works placed him at the head of the French genre painters of the day. "The Deceived Blind Man" (1755) secured his election to the Royal Academy; and with the kindly aid of Abbé Goujenot he went to Rome in 1755, but his stay there luckily exercised little influence upon his art. Rome was, however, the scene of his sincere and ideal love affair with the beautiful Princess Letitia, daughter of the Duke del Orr. On his return to Paris he exhibited the series of genre paintings of moral intent, which were greeted with acclaim: "The Village Marriage" (1761), "The Father's Curse" (1765), "The Wicked Son Punished" (1765)—all in the Louvre—and "La Bonne Mere" (The Beloved Mother). Not until 1769 did he send his long-delayed diploma picture, "Severus and Caracalla," for admission to the Academy. He was admitted, but expressly as a genre painter. Greatly incensed, Greuze held aloof from the Academy, and did not exhibit until after the Revolution, in 1804. Greuze now stood at the zenith of popular favor. His portraits also were prized, and the most prominent personages, in-



GREUZE

"THE BROKEN PITCHER," FROM THE PAINTING IN THE LOUVRE, PARIS

cluding the Dauphin, were among his sitters. In 1777 the Emperor Joseph II bestowed upon him a patent of nobility and 4000 ducats to support the rank. His income from engravings after his popular works was very great. But his happiness was marred by the outrageous conduct of his beautiful wife, who browbeat her gentle and confiding spouse, pilfering his resources in the interest of her many amours. Such celebrated paintings as "The Broken Pitcher" (Louvre) and "The Broken Mirror" (Wallace collection, London) are said to typify his unhappiness. After their separation in 1785 he lived with two daughters, both painters. The French Revolution greatly reduced his income, although leaders such as Robespierre, Gensonne (Louvre), Danton, and Bonaparte (Versailles) sat to him for portraits. He died in poverty in Paris, March 21, 1805.

Greuze's art is a reaction from the frivolous and artificial themes of the rococo and typifies tendencies like those of Jean Jacques Rousseau in literature. He was for France the originator of a particular kind of genre, depicting the virtues of the middle classes, in contrast to the prevailing vices of the aristocracy. But better than these more ambitious productions are his representations of young girls of subtle and innocent yet somewhat voluptuous charm, usually with a touch of melancholy and in rather sentimental poses. In such works he ranks among the first French painters of the eighteenth century. His paintings are excellent in line, and, notwithstanding their high finish, they are admirable in color. His very mannerisms are attractive. Among his best-known paintings are "The Milkmaid" and "Friendship," in the Louvre; "Girl with Doves," "Grief," and "Innocence," in the Wallace collection, London; "The Dead Canary," National Gallery, Edinburgh; "Girl with a Bird Cage," South Kensington Museum, London; and "Girl Winding Wool," J. P. Morgan collection (Metropolitan Museum, New York). Among the best of his portraits are those of Jeaurat, Fabre d'Eglantine, and the Artist, in the Louvre, and of Sophie Arnould, in the Wallace collection. He is represented in nearly all the principal public collections of France, including most provincial museums, and in Germany and England; but best of all in the Louvre and the Wallace collection, and in Montpellier, St. Petersburg, and Edinburgh.

Bibliography. No satisfactory biography of Greuze has yet appeared. Consult: Goncourt, *L'Art du dixhuitième siècle,* vol. i (Paris, 1880); Lalaing, *Watteau et Greuze* (ib., 1888); Normand, *Jean Baptiste Greuze* (ib., 1892); Lady Dilke, *French Painters of the Eighteenth Century* (London, 1899); Frantz, in Foster, *French Art from Watteau to Prudhon,* vol. iii (ib., 1907); Rivers, *Greuze and his Models* (ib., 1912).

GRÈVE, grâv, PLACE DE LA. The former name of the present Place de l'Hôtel de Ville at Paris, so called from its position on the river bank. It was a favorite gathering place of unemployed laborers and the scene of the chief popular festivities. In it many famous criminals and political offenders have been executed, among them Ravaillac, the murderer of Henry IV, the Marquise de Brinvilliers, the highwayman Cartouche, and Damiens, the would-be assassin of Louis XV. The place received its present name in 1806.

GREV'ILLE, CHARLES CAVENDISH FULKE (1794–1865). An English diarist. He prepared for college at Eton, entered Christ Church College, Oxford, but left without a degree to become the private secretary of Lord Bathurst. Later he was appointed to the secretaryship of Jamaica —a sinecure position, as he never visited the island. At the age of 27 he became clerk of the council, a position he held till 1859, and by means of it became conversant with the plans and purposes, as well as with the men themselves, of every ministry of these 40 years. As he was keen, honest, and unbiased, and possessed of a vigorous and interesting style, he was qualified to record the events and life around him. He improved his opportunity by keeping a political diary or journal for a large portion of his life. These memoirs were placed in the hands of his friend, Mr. Henry Reeve, with the injunction to have them published at a not too distant date after his death. Acting on this request, the diary for the reigns of George IV and William IV (1820–37) was published in 1875 in three volumes. Later, other volumes, covering the years from the accession of Queen Victoria to 1860, were issued. The memoirs afford a valuable insight into the private views and motives of the leaders of English political life. Greville records not so much public events as the private causes which led to them; and perhaps no English memoir writer has left behind him a more valuable contribution to the history of last century. Greville published anonymously, in 1845, a volume on the policy of England towards Ireland, in which he advocated the payment of the Roman Catholic clergy; he was also the author of several pamphlets on the events of his day.

A biographical notice by Henry Reeve may be found in the preface to his edition of the *Greville Memoirs* (London, 1875); consult also the *English Historical Review,* January, 1886, and April, 1887. His works have been collected and edited under the title *Greville Memoirs: Journal of the Reigns of George IV, William IV, and Queen Victoria* (8 vols., London, 1896).

GREVILLE, SIR FULKE, first LORD BROOKE (1554–1628). An English poet and courtier, born at Beauchamp Court, Warwickshire. He entered Shrewsbury School in 1564 on the same day with Sir Philip Sidney, and an intimacy grew up which remained unbroken until Sidney's death. Though he matriculated at Jesus College, Cambridge (1568), while Sidney went to Oxford, the two kept in constant communication, and in 1577 they went together to the court of Queen Elizabeth, where Greville at once found great favor. He made several visits to the Continent, where he met many men of distinction. He saw some service in Normandy under Henry IV about 1591, was four times a member of Parliament between 1592 and 1620, became Treasurer of the Navy in 1598, and in 1603 was confirmed for life as Secretary for Wales, to which position he had originally been appointed in 1583. On the accession of James I, Greville was made Knight of the Bath. From 1614 to 1621 he was Chancellor of the Exchequer. He was made Baron Brooke in 1621, but his political activity as a peer was limited to service in the Council of War in 1624 and membership in a few committees. He was stabbed by an old servant, one of the witnesses of his will, to whom he had not left a legacy, and died Sept. 30, 1628. Of Lord Brooke's literary work little appeared during his lifetime except a few scattered poems and

The Tragedie of Mustapha (1609), the text of which was subsequently altered. The bulk of his poetical work was published in 1633, in a single folio containing *A Treatie of Humane Learning; An Inquisition upon Fame and Honour;* and *A Treatie of Warres*, together with an improved text of *The Tragedie of Mustapha; The Tragedie of Alaham;* and *Cœliea*, the last a collection of so-called "sonnets," which, however, were not written in the sonnet form. His longest work, *The Life of the Renowned Sir Philip Sidney*, in prose, which was as much autobiography as biography, with interesting and original views on politics, appeared in 1652. A reprint of this work, edited by N. C. Smith, was published in Oxford in 1907. All of his metrical writings, save his "sonnets," were written in a close, subtle style, and his subjects were not well adapted to poetic expression; and all tendencies towards fanciful grace are lost in the philosophy and argumentativeness that characterize his versified tracts. His extant works, in four volumes, were reprinted in the *Fuller Worthies Library*, edited by Grosart (1870).

GRÉVILLE, grå′vêl′, Henry (1842–1902). Pseudonym of Alice Marie Céleste Durand. A French novelist and very popular purveyor of emotional sensationalism. She was born in Paris. Of her many volumes those of Russian life are best. Of these *Dosia* (1876) and *Sonia* (1877), both reprinted in America, are sufficiently typical. Her literary career began in Russia with stories and sketches contributed to the *Journal de Pétersbourg* (1868–72), but when her husband lost his professorship in the law school there she returned to Paris. In 1886 she lectured in the United States on French and Russian literature and embodied parts of her experience in *Frankley* (1887), a mediocre novel. She wrote also dramas, and several times revisited America. Consult Ernest-Charles, *Les samedis littéraires* (Paris, 1903).

GREVIL′LEA (Neo-Lat., named in honor of the English botanist Robert Kaye Greville). A genus of about 150 species of Australian trees and shrubs, which belong to the family Proteaceæ. Some species are of considerable economic importance. One of the most common and important is the silk oak (*Grevillea robusta*), a tree of rapid growth, which attains a height of 150 feet or more. Since it resists drought remarkably, it is of value for desert cultivation. The wood is elastic and durable and is especially valued for barrel staves. In every country where this tree has been introduced it is highly esteemed. It is hardy in California, where it is valued as a shade tree in the vicinity of San Francisco. It is easily grown from seed to some extent in hothouses on account of its graceful fernlike foliage. For decorative purposes it is used only while young. The timber of *Grevillea linearis* is harder and closer-grained and, since it takes a good polish, is extensively used for furniture, cabinet, and fancy work.

GRÉVY, grå′vê′, Albert (1824–99). A French statesman, born at Mont-sous-Vaudrey (Jura), the brother of Jules Grévy, President of France. He studied law and became president of the Corporation of Barristers at Besançon. In 1871 he represented the Department of Doubs in the National Assembly, was Vice President of the Chamber, was civil and military Governor of Algeria (1879), and was elected life senator in 1881. He was seriously involved in the Panama Canal scandal and was under a cloud for some time.

GRÉVY, Jules (1807–91). President of the French Republic. He was born Aug. 15, 1807, at Mont-sous-Vaudrey (Jura), of an old and respected family. After receiving a good classical education Grévy went to Paris to study law. While still a student, he took part in the revolution of 1830, and, being later admitted to the bar (1837), he showed his Republican sympathies by acting for political prisoners before the Paris tribunals, notably in 1839, in the case of two Republican friends of Barbès (q.v.). In 1848 Grévy was appointed by the provisional government Commissioner General in the Jura District and was returned as deputy to the Constituent Assembly. In this capacity he was an independent and generally voted with the extreme Left. After Louis Napoleon's coup d'état Grévy withdrew from politics and devoted himself to his professional work. He rose to great eminence in his profession and was elected *bâtonnier*, or president, of the Paris bar. He returned to politics in 1868 as a deputy to the Corps Législatif from the Jura Department and acted as a moderate Republican. After the Franco-German War he was elected to the National Assembly at Bordeaux and was chosen its President, a post he resigned in 1873. He reëntered the Chamber in the general election of 1876 and became its President. When Marshal MacMahon resigned the presidency of the Republic in 1879, Grévy was elected his successor, January 30, and he was reëlected in 1885. During his first term of office Grévy was distinguished by the moderation of his views, his sagacity, and unostentatious mode of life. Calm and judicious, he was able to intervene successfully in the problems of the day. But unfortunately his popularity was destroyed entirely during his second term by the revelations of a scandalous trade in offices and decorations of honor carried on by his son-in-law, Wilson, and he was forced to resign, Dec. 2, 1887. He died at Mont-sous-Vaudrey, Sept. 9, 1891. In 1873 Grévy published a pamphlet, *Le gouvernement nécessaire*, in which he pleads for the strengthening of the Republic. His *Discours politiques et judiciaires, rapports et messages* were edited with an introduction by Delabrousse (1888). Consult also Bertrand, *Le président Grévy* (Besançon, 1892). For short biographies in English, consult King, *French Political Leaders* (New York. 1882), and "Biographies of Eminent Persons," reprinted from the London *Times* (London, 1896).

GREW, Nehemiah (1641–1712). An English physician and botanist, born in the parish of Mancetter. He graduated at Cambridge in 1661 and 10 years later took the degree of M.D. at Leyden. In 1677 he was appointed secretary of the Royal Society and held this position for several years. He was the first to write upon the anatomy and physiology of plants, although his priority in this field was for a time doubtful owing to the researches of Marcello Malpighi. His works include: *The Anatomy of Vegetables Begun, with a General Account of Vegetation Grounded Thereon* (1672); *The Comparative Anatomy of Trunks* (1675); *A Discourse of the Colors of Plants* (1677); *Cosmologia Sacra, or a Discourse of the Universe* (1701).

GREWIA, grōō′ĭ-ȧ (Neo-Lat., named in honor of Nehemiah Grew). A genus of trees which belong to the family Tiliaceæ. Its members have simple and more or less ovate leaves and a drupaceous fruit. They are African, Australian, and Asiatic, mostly tropical and subtropical. Some species, as *Grewia sapida* and *Grewia asiatica*, natives of the warmer parts of India, yield edible fruits, much used in the manufacture of sherbet. By the inhabitants of the Himalayas the inner bark, or bast, of *Grewia oppositifolia*, like that of the lime tree in Europe, is used for cordage; and the leaves of *Grewia lævigata* and other species are given as fodder to cattle. The wood of this species is used for boats. That of *Grewia asiatica* is much valued where strength and elasticity are required, as for making bows and the shafts of carriages. The Australian species, *Grewia polygama*, and the Malaccan *Grewia latifolia*, yield respectively a fruit used to make a pleasant beverage, and a hard, close-grained wood that takes a high polish. The trees do not attain sufficient size to be very valuable. One or two species have been introduced into Florida and California. The bast fibre of a number of species is used for rope-making.

GREWINGK (grā′wiṉk) **ISLAND.** One of the remarkable ever-changing volcanic islands of the Bogoslov group, Alaska. Grewingk, sometimes called Fire, or New, Bogoslov, was upthrown from the sea in 1883, since which time it has frequently changed its form and mass.

GREY, ALBERT HENRY GEORGE, fourth EARL (1851–). A British administrator. He was educated at Harrow and at Trinity College, Cambridge, where he graduated in 1873. He early entered upon a political career and in 1878 was elected a Liberal member of the House of Commons for the southern division of Northumberland, though unseated on a technicality the same year. Later he sat for the same division (1880–85), and for another division of the same county (1885–86), being defeated in 1886. In 1896–97 he was Administrator of Rhodesia, British South Africa, and from 1898 to 1904 a director of the British South African Company. He was the close friend and to some extent the political ally of Cecil Rhodes (q.v.) in the latter's work of consolidating British power in South Africa. In 1904–11 he was Governor-General of Canada and made himself very popular by his active interest in the social life and economic progress of the country. He inaugurated the new provinces of Alberta and Saskatchewan in 1905 and made a journey through the Arctic regions by way of Winnipeg, Fort Churchill, Hudson Bay, and Newfoundland, to establish the practicability of the sea route for trade and other purposes. He published *Hubert Hervey: A Memoir* (1899).

GREY, CHARLES, first EARL GREY (1729–1807). A British general, born at Howick, England. He was made an ensign in the English army in 1748 and accompanied his regiment upon various expeditions, serving as aid-de-camp to Ferdinand of Brunswick during the Seven Years' War. In 1776 he went to America with Howe's forces and was promoted to the local rank of major general (1778). He defeated Gen. Anthony Wayne at Paoli and Baylor's corps of Virginia Dragoons at Tappan. He commanded a brigade at the battle of Germantown. Upon his return home in 1782 Grey was made lieutenant general, and given command of the entire British army in America, but the war came to an end before he could resume his military duties. In 1793, with Jervis, he commanded the expedition to put down the revolt in the West Indies. He was made Baron Grey of Howick in 1801, and in 1806 his title was advanced to Viscount Howick and Earl Grey.

GREY, CHARLES, second EARL GREY (1764–1845). An English statesman, born March 13, 1764, near Alnwick, Northumberland, of an ancient family, and educated at Eton and at King's College, Cambridge. After traveling on the Continent he became, in his twenty-second year, a member of Parliament for his native county. Abandoning the politics of his family, he became a follower of Fox, making his maiden speech in opposition to the address of thanks to the King for negotiating the commercial treaty with France. He soon obtained a leading position in the House of Commons and was one of the managers of the impeachment of Warren Hastings. A prominent member of the Society of Friends of the People, in 1793 he was solicited to present a petition from this society in which the defects and abuses of the "rotten borough" system were forcibly exposed. On a motion for reform he was outvoted on this occasion and again in 1797. In 1799 he opposed the proposal for the Irish union, but recommended the abolition of 40 "rotten boroughs" in Ireland as a means of securing the independence of Irish members. When the Whig administration of Lord Grenville came into office in 1806, Grey, now Lord Howick, became First Lord of the Admiralty. Fox died in September and was succeeded by Grey as Secretary of State for Foreign Affairs and leader of the House of Commons. The cabinet was broken up in 1807, but not before it had carried the abolition of the slave trade and the enlistment of soldiers for a limited period instead of for life. By the decease of his father in 1807 he was removed from the House of Commons to the Upper House. Grey and Lord Grenville, as the leaders of the Whig opposition, were more than once desired by the Prince of Wales, after he had become Regent, to coalesce with the Tory ministry, but his overtures were firmly rejected. Grey actively opposed the bill of pains and penalties against Queen Caroline. During the long period in which he remained in opposition, from 1807 to 1830, he gave a strenuous support to the abolition of religious tests, the removal of Roman Catholic disabilities, and the amelioration of the criminal code. When Parliament met in November, 1830, he again urged the adoption of measures of temperate reform. In answer to this the Duke of Wellington indiscreetly pronounced the existing system of representation as nearly perfect as possible. The overthrow of the administration followed speedily as a consequence, and the Whigs, returning to power, were permitted to fix the character and extent of reform.

Grey now became Prime Minister, and, March 1, 1831, his ministry presented a bill, prepared by a subcommittee of the cabinet led by Lord John Russell (q.v.), which provided for moderate yet extensive changes: (1) in the distribution of seats in the Commons (disfranchising many "rotten boroughs" and increasing the representation of the northern cities and boroughs); (2) in extending and simplifying the suffrage; and (3) in equalizing conditions in many other ways. The bill was fiercely opposed, and upon the motion of General Gascoyne amended, an act which caused Grey to advise

William IV to dissolve Parliament and appeal to the people. When the new Parliament met, the bill was carried through the Lower House by large majorities. The second reading was moved by Grey in the House of Lords, Oct. 3, 1831. After five nights the bill was thrown out by 199 votes against 158. The reply of the House of Commons was an immediate vote of confidence in the Ministers. The King prorogued Parliament in order that after the shortest possible interval the bill might be again introduced. Riots took place at Nottingham, Derby, and Bristol. At Birmingham a large mob threatened to march upon London. A second reform bill passed the House of Commons, which also passed a second reading in the House of Lords, the Tories being determined to mutilate it in committee. Lord Lyndhurst moved the postponement of the disfranchising clauses, and, the Whigs being beaten, Grey resorted to the extreme remedy of demanding from the King a new and large creation of peers. Consent to this was refused, and Grey resigned. The King thereupon sent for the Duke of Wellington, but, Sir Robert Peel refusing to join the Duke in the attempt to form a government, Grey again returned to office, armed with the written authority of the King to create as many peers as might be necessary to secure the safety of the bill, and on June 4, 1832, without the exercise of that authority, the Reform Bill passed the House of Lords.

Grey took office on the principles of peace, retrenchment, and reform. His government, however, lost a good deal of its popularity in England by his deference to the Lords, and his attempts to conciliate his opponents by a division of patronage. In Ireland Stanley's quarrels with O'Connell and the Irish repealers also tended to weaken the government. Many important measures were, however, passed—as the measure for national education in Ireland, the Irish Church Temporalities Bill, and the bill for abolishing slavery in the West Indies. In December, 1834, the Grey ministry fell to pieces on the Irish Coercion Act, and Grey retired from public life. He died July 17, 1845. Consult: Grey, *Life and Opinions of Charles, Second Earl Grey* (London, 1861); Lord Holland, *Memoirs of the Whig Party* (ib., 1842–54); Roebuck, *History of the Whig Ministry* (ib., 1890); Strange, *Correspondence of Princess Lieven and Earl Grey, 1824–34* (ib., 1890); *The Correspondence of William IV and Earl Grey* (ib., 1867).

GREY, Sir Edward (1862–). A British statesman, born in Northumberland, April 25, 1862. He was educated at Winchester and at Balliol College, Oxford, entered Parliament in 1885 as a member for Berwick-on-Tweed, and thereafter continued to sit for the same constituency. He was Undersecretary of State for Foreign Affairs in 1892–95 and later was a follower of Lord Rosebery in that statesman's policy of opposition to a continuance of the alliance between the Liberals and the Irish Nationalists. He was made Privy Councilor in 1902. In December, 1905, he became Secretary of State for Foreign Affairs, and at this post he rapidly became the most commanding figure in European diplomacy. Although he preserved unusual reticence, he won the confidence of his own countrymen of both parties to a remarkable degree, and he dominated the councils of Europe more completely than had been done by any other English Secretary subsequent to the Crimean War. He consummated the Triple Entente uniting Great Britain, France, and Russia, but, on the other hand, he failed to effect more cordial relations with Germany. When, in 1908, Austria formally annexed Bosnia and Herzegovina, Sir Edward demanded that the matter be submitted to a conference of the Powers; but, finding himself powerless to enforce his demand, he suffered a diplomatic defeat and injured the relations between Great Britain and Austria. In 1911, during the quarrel between Germany and France over Morocco, Sir Edward took a firm stand against permitting German expansion in North Africa, and to the charge of the German Minister of Foreign Affairs that Great Britain had gone beyond its proper sphere in the matter, he replied that his country had not been aggressive, but only consistently firm in upholding its right to be consulted and in letting it be understood that Great Britain would not be willing that France should make unwarrantable concessions. In the following year Russia reaped in Persia some advantages from the Anglo-Russian *entente* of August, 1907. Sir Edward was at his best in the crisis of 1912 in which the Balkan peoples made war on Turkey, for on this occasion he instituted the conference of European ambassadors in London and presided over their deliberations with a dominating influence for peace. But in 1914, when a quarrel arose between Austria and Servia, occasioned by the assassination of the Austrian Crown Prince by Servians in Sarajevo, Sir Edward's appeals to Germany and Austria to submit the matter to arbitration were in vain, and he was powerless to prevent a great European war. Among the speeches of Sir Edward the best known is one entitled *The Peace of the World*, delivered in the House of Commons March 13, 1911. For an appreciation of his public services, consult Sydney Brook's article "Europe's Ablest Diplomat," in *Harper's Weekly* (New York, May 3, 1913); and for an adverse criticism, consult Perris, *Our Foreign Policy and Sir Edward Grey's Failure* (London, 1913). See War in Europe.

GREY, Francis Thomas de. See Cowper.

GREY, Sir George (1812–98). A British colonial governor. The son of Lieutenant Colonel Grey, who fell at Badajoz, he was born at Lisbon, Portugal, April 12, 1812. He was educated at Sandhurst Military College, and on attaining his captaincy he received an official commission, on application, to explore interior Australia. He started on his journey in 1837 and the following year organized another expedition to explore the Swan River District. The results were embodied in two books published on his return to England in 1840. His enterprise and ability obtained for him, unasked, in 1841, the post of Governor of South Australia. In 1845 he was made Governor of New Zealand. His government was so wise and conciliatory that in 1848 he was made K.C.B. (civil), and in 1854 was appointed Governor of Cape Colony. The task of allaying the irritation left by the Kaffir War demanded high powers of statesmanship, and Grey was equal to the occasion. In 1858, however, the Colonial Office interfering with measures which he considered necessary, he threw up his post and came to England. Public opinion at the Cape was so strongly manifested in his favor that he was requested by the government to resume his governorship. On the breaking out of the Indian Mutiny Grey sent every soldier he could spare to the assistance of the Indian government. In 1861 he was again appointed Governor of New Zealand, in the hope that he would bring the war then raging there to a satisfactory conclusion, and he succeeded in bringing about pacific relations with the Maoris. He resigned his office and returned to England in 1867, but afterward resided in New Zealand and from 1877 to 1879 was Premier of the colony. He returned to England in 1894 and died in London, Sept. 18, 1898. Grey was the author of *Journals of Discovery in Australia* (1841); *Polynesian Mythology* (1855); *Proverbial Sayings of the Ancestors of the New Zealand Race* (1858). Consult Rees, *The Life and Times of Sir George Grey* (London, 1892), and Henderson, *Sir George Grey* (ib., 1907).

GREY, Henry George, third Earl (1802–94). An English parliamentarian and administrator, eldest son of Charles, second Earl Grey. He was born at Howick, Northumberland, Dec. 28, 1802, and was educated at Trinity College, Cambridge. He held the title of Viscount Howick from 1807. His long parliamentary career began in 1826, with his election to the House of Commons as a Whig, from Winchelsea. When, in November, 1830, the Wellington ministry gave place to that of his father, Earl Grey, he became Undersecretary of State for the Colonies. In this position he introduced a bill for the encouragement of emigration and opposed the practice of making large land grants. In 1833 he resigned his office, on account of the refusal of the cabinet to undertake the immediate rather than the gradual emancipation of slaves in the West Indian colonies. For the first six months of 1834 he was again in office as Undersecretary of State for Home Affairs, and in April, 1835, became Secretary of State for War in Lord Melbourne's cabinet and received an appointment as Privy Councilor. The independence which marked his whole career led in 1839 to his withdrawal from the cabinet because of his opposition to its measures in regard to colonial affairs, particularly the crisis in Canada. He continued to take a prominent part in parliamentary debates and was the author of the amendment to the Irish Franchise Bill in 1841 which eventually led to the defeat of the government.

He took advanced views in favor of free trade, and his speeches had an important influence in leading his party to accept that doctrine. Upon the death of his father, in 1845, he succeeded to his title and took his seat in the House of Lords, where he soon became the Whig leader. Upon Lord John Russell's attempt to organize a ministry in December, 1845, he was offered a portfolio, but refused at the time, because Lord Palmerston had also been invited to join it. Six months later he changed his mind and became Secretary for the Colonies in the same cabinet in which Lord Palmerston was Foreign Secretary. His administration of the Colonial Office, which lasted until 1852, was marked by many experiments, not all of which were successful, by a policy of extension of representative government to the colonies wherever practicable, by the establishment of colonial free trade, and by the recognition that colonies should be governed for their own benefit. From the close of Lord Russell's administration in 1852 until his death, although never again holding office, he was an active and important figure in Parliament. He pursued a course of great independence, allied himself with neither party, always sharply criticized both Liberals and Conservatives, particularly in their administration of colonial and foreign affairs, and was one of the most strenuous opponents of Gladstone's home-rule policy for Ireland. He died Oct. 9, 1894. He wrote: *The Colonial Policy of Lord John Russell's Administration* (2 vols., 1853); *Parliamentary Government* (1858); *Free Trade with France* (1881); *Ireland: The Causes of its Present Position* (1888); *The Commercial Policy of British Colonies and the McKinley Tariff* (1892); and edited his father's *Correspondence with William IV* (1867).

GREY, Lady Jane (1537–54). The great-granddaughter of Henry VII and second cousin of Edward VI, daughter of Henry Grey and Lady Frances Brandon. Her teacher, Aylmer, afterward Bishop of London, taught her Greek, Latin, French, and Italian, in addition to something of the arts and sciences. At the age of nine she entered the household of Queen Catharine Parr, with whom she remained till the death of that lady two years later, when she appeared as the chief mourner. After Catharine's death she became the ward of Thomas Seymour, whom the Queen had married on the death of Henry VIII. Seymour planned to marry her to Edward VI; but in this he was thwarted by his brother, the Duke of Somerset, who wished Edward as the husband of his own daughter. This rivalry led to the death of her guardian. Her father, now Duke of Suffolk, after the fall of Somerset in 1549, allied himself with John Dudley, Duke of Northumberland, perhaps the ablest man—certainly one of the most ambitious men—of his time. Northumberland was now Lord Protector to Edward VI and resolved to win the crown for his own family. To this end he arranged a marriage of Lady Jane with his fourth son, Guilford Dudley, and persuaded Edward to change the order of succession as established by Henry VIII, passing his sisters, Mary and Elizabeth, thus leaving the crown to his cousin, Lady Jane. Lady Jane seems to have been kept in ignorance of the intent of her father and father-in-law until the death of Edward (July 6, 1553). Two days later the public announcement was made, and on the 9th she was taken before the Council for acknowledgment. At this meeting she is said to have swooned, and only after the most earnest persuasion was she prevailed upon to issue the proclamation of her accession to the throne. In 10 days the intrigue was ended; Mary was the acknowledged Queen of England. Mary recognized Lady Jane's innocence and for some months resisted the demands of the Spanish Minister and the radicals of Mary's party that she should be tried and beheaded. Her father weakly joined the Wyatt rebellion, thus losing his own life and bringing death upon his daughter, who with her husband was beheaded Feb. 12, 1554. Consult: Howard, *Lady Jane Grey and her Times* (London, 1822); Nicolas, *Memoirs and Literary Remains of Lady Jane Grey* (ib., 1832); Burnet, *History of the Reformation of the Church of England* (Oxford, 1865); Sidney, *Jane the Quene* (London, 1900); I. A. Taylor, *Lady Jane Grey and her Times* (New York, 1908); Davey, *The Nine Days' Queen, Lady Jane Grey and her Times* (London, 1909). Original material may be found in *Letters and Papers of Henry VIII*, edited by Brower and Gairdner for the "Rolls Series"; Ellis, *Original Letters*, 1st series (London, 1824).

GREYCOAT SCHOOL, or **HOSPITAL.** A noted London charity school, founded in 1698 by Anne, the future Queen of England, for the education of poor boys and girls. The uniform of the inmates is gray in color. It is now a school for 400 girls.

GREYFF, SEBASTIAN. See GRYPHIUS, SEBASTIAN.

GREY'FRI'ARS. A Franciscan monastery in London, established during the reign of Henry III and once the burial place of many prominent persons. Its site was till 1902 occupied by Christ's Hospital.

GREY'HEN'. The female of the blackcock (q.v.).

GREY'HOUND' (AS. *grīghund*, Icel. *greyhundr*, greyhound, from Icel. *grey*, dog [cf. *greybaka*, bitch, *grey-karl*, dogged churl], Ir., Gael. *grech*, hound + *hundr*, AS. *hund*, Goth. *hunds*, hound; ultimately connected with Lat. *canis*, Gk. *κύων*, *kyōn*, OIr. *cu*, Lith. *szù*, Skt. *śvan*, dog). Specifically and colloquially, the term "greyhound" indicates the dog used in England to course the hare and in America the jack rabbit. But in a broader sense and in fact the greyhounds are a group of dogs generically known as "long dogs," having a common origin and form and, in all cases but one, a uniform method of pursuing their quarry, i.e., by sight and not by scent. They vary from one another only in their hairy covering and the kind of game which they pursue, both of which characteristics are due to local environment. The group embraces the English and American greyhounds, the borzoi or Russian wolfhound, the Scotch deerhound, the Irish wolfhound, the Persian and Levantine "long dogs," and the Italian greyhound.

The earliest notices of the long dogs in literature are those in Ovid's *Metamorphoses* and in the poem on "Hunting" by Gracian the Faliscan. Mention of the *Canis gallicus* is also to be found in the works of Martial, Julius Pollux, and Oppian. In the time of Arrian (150 A.D.) coursing with greyhounds had become an established recreation, and in the *Cynegetica* of Nemesian, in the third century, the greyhound, and the arts of breeding, rearing, and feeding him, are treated at length. There is no doubt as to the similarity of these dogs to the entire group of the dogs of to-day. The greyhound was so highly esteemed that it was protected even by the Salic, Burgundian, and German barbaric codes, and Spelman is authority for the statement that at the court of Charlemagne there was a special officer of the greyhound kennel.

The essential characteristics of both the English and the American greyhound are keen sight and great speed; consequently they have great muscular development of the hind legs and great chest capacity. The standard laid down by the Greyhound Club, the ruling authority on the subject, comprises the following points: "Head large between the ears and pointed; long, strong jaws; eye bright and penetrating; ears small and folding when at rest, but semipricked when at gaze; a chest fairly deep and as wide as consistent with speed; strong shoulders, a broad and powerful back, and very muscular hind quarters." The hair is as close, short, and fine as velvet. Color in the modern dog is by no means as uniform as it must have been in early times, when black or black and white prevailed.

Irish Wolfhound or Greyhound. This variety has a legendary history of great antiquity, and it was often seen in the Roman arena. The breed has never been absent from the royal kennels of England since the reign of King John. Undoubtedly up to the time of the disappearance of the last wolf, about 1710, it was a great rough-coated dog of the greyhound type. As the wolf became scarce and the dog began to be used more for hunting deer and foxes, it became smaller and more slender, though still of proportions exceeding any other of this type of dog. One measured early in the nineteenth century for the Linnæan Society was 61 inches long, including the tail (17½ inches), and stood 28½ inches high at the shoulder. The hair had by that time become shorter and smoother, and the color varied from browns to black and white. Gradually the breed became smaller, until about 1850, when interest in it revived, and to-day there are clubs on both sides of the Atlantic devoted to its development. The standard adopted is that of the earlier rough-haired dog, with a minimum height for dogs of 31 inches and 120 pounds' weight, with 28 inches and 90 pounds' for bitches. Large modern specimens have been bred. "Thiggum Thu" was 34 inches high, and his female mate 30, yet both were true to the type and graceful in their movements. See WOLF DOG.

Scotch Deerhound. This is one of the oldest British breeds, is still used for deer hunting in the Scottish Highlands, and hunts by both sight and scent. In general appearance it strongly resembles the old Irish wolfhound, with a rough-haired coat, a bearded snout, and half-pricked ears; but it is sharper, swifter, and more sagacious than the Irish hound. It is a great favorite wherever it goes. The clubs especially devoted to it call for dogs from 28 to 30 inches high, or even more, weighing from 85 to 105 pounds, with harsh wiry hair 3 to 4 inches long, straight strong forelegs, and hind legs well bent at the stifle, with great length from hip to hock; a chest deep rather than broad, and a very strong neck, an essential for holding a deer. The earliest record of the Scotch deerhound is on the sculptured stones in the churchyard of Meigle in Perthshire, Scotland, which Chalmers attributed to the ninth century.

Borzoi, or Russian Wolfhound. This variety, sometimes called "psovie," is one of the greyhound family adapted to withstand the intense cold of the Asiatic plateaus and to travel over snow. To this end all these hounds, whether from Tibet, Persia, or Russia, have an abundance of warm silky hair, and large hair-covered feathery feet. The modern specimens, from which the typical show dog is chosen, come from Russia, where the czars have for a long period maintained a large kennel of the best specimens. In that country they are used to kill wolves and are trained for that purpose. When wolves are sighted, the dogs are unleashed. Their great speed enables them to overtake the wolf, which they strike with their fore shoulder and knock over; as the wolf rises, another dog strikes it in like manner, until the huntsman following on horseback arrives and kills the wolf with spear or knife. While ferocious in the chase, this great hound is at other times most docile and good-tempered. There are two breeds—the Circassian, or shorter-coated, by some considered the better for deep soft snow; the other having a long, silky, flowing coat, reaching sometimes on the body to a length of 5 inches, while on the tail it sometimes grows to be 14 inches long. The height of good specimens varies in males from 28 to 33 inches, and in females from 26 to 30, and they should weigh from 75 to 105 pounds for dogs, and 60 to 80 pounds for bitches. The legs are very flat in the bone, giving them an exceedingly slender look from the front, and the feet are long, with a profusion of soft hair. The hind legs are set somewhat forward, which gives the dog, when standing, the appearance of being slightly humpbacked. The chest is deep and not wide, and the sides are flat, wherein this dog differs entirely from the English greyhounds. In color the dogs vary, black and white and tan alternating in well-defined patches.

The "brinjaree" is a variety of the rough or long-haired borzoi, used in the Deccan of India and said to be the best hunting dog in the East Indies. It is generally yellow or tan in color.

Italian Greyhound. This is a fancy variety of the true greyhound in miniature, probably first bred as a toy or ladies' pet, which it has remained for many hundred years past. It is only needful to mention that dogs should not exceed 7 to 7½ pounds in weight, and females 5 pounds, to indicate the necessity of daintiness in build, while symmetry of head and neck is essential to perfection. Color is a matter of individual taste; they range from black through the blues to fawn, and even, though rarely, to all white. The last is the most esteemed color at present. The Italian greyhound must be looked at entirely from an artistic and not a utilitarian standpoint. They are prancing, dainty little luxuries, and nothing more.

Whippet. This is the last development from a small greyhound crossed by the terrier. It was originally bred for rabbiting; but it developed such a propensity for racing that whippets are now mainly used for that sport. At the farther end of the proposed course the dogs' handler stands and shakes a rabbit skin or cloth, which excites the dogs to a high pitch. They are then released and will race to that point at a speed exceeding that of any other dog. The form of the greyhound predominates in them; but their eagerness to contest and undying pluck are derived from their terrier blood. As a rule, 15 pounds is taken as handicap weight. Consult authorities cited under the article DOG; and see Plate of HUNTING AND WATCH DOGS.

GREY′LAG. See GOOSE.

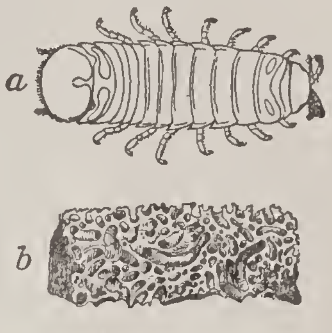
GREYLOCK, grā′lŏk, MOUNT. The highest mountain in Massachusetts, situated about 5 miles southwest of the city of North Adams, Berkshire County (Map: Massachusetts, A 2). It is 3505 feet high and commands a remarkably fine view, overlooking the valley of the Hoosac and its villages on the north, beyond which are visible the peaks of the Green Mountains. Mounts Monadnock and Wachusett may be seen toward the east. On the south are the Berkshire Hills, and far away to the southwest, beyond the Hudson, may be seen the Catskills. A large tract of the upper part of the mountain, amounting to about 14,000 acres, has been purchased by the State for a park. Consult Niles, "Greylock Park Reservation," in the *New England Magazine*, vol. xlv (December, 1911).

GREY′MOUTH. A seaport of Grey Co., South Island, New Zealand, at the mouth of the Grey River, on the west coast, 105 miles north-west of Christchurch and 190 miles south-southwest of Nelson by rail (Map: New Zealand, South I., C 3). It has fine harbor accommodation, with extensive wharfage, and is important as the centre of a considerable coal-mining and auriferous district. Saw milling and the preparation of bricks and fire clay are important industries. Pop., 1901, 3800; 1911, 5469.

GREYSON, grȧ′zôɴ′, EMILE (1823–). A Belgian novelist and educator, born in Brussels. His novels, very popular in Belgium, and his other writings include: *Fiamma Colonna* (1857); *Les récits d'un Flamand* (1859); *Sites ardennais* (1860–62); *Les magots de Téiers* (1863); *Aventures en Flandre* (1882); *Entre bourgeois* (1883); *Les aberrations de Maxime sur l'éducation* (1888); *Hier—aujourd'hui* (1890). In later life he was prominently identified with educational work, as director of higher and intermediate instruction and as a contributor to various reviews, especially the *Revue de l'Instruction Publique*.

GREY′TOWN. See SAN JUAN DEL NORTE.

GRIB′BLE (of obscure origin; possibly connected with *grubble*, *gropple*, to grope, AS. *grāpian*, to grasp, from *grīp*, grip, from *grīpan*, to grasp, or with *grub*, Ger. *grübeln*, to dig; connected with Ger. *graben*, AS. *grafan*, to dig, Eng. *grave*, and probably Gk. γράφειν, *graphein*, to write). A minute boring isopod (*Limnoria lignorum*), which abounds upon the northern seacoasts, and sometimes does serious damage by perforating piles and submerged woodwork, for the sake of feeding on the wood. Where present, it is extremely numerous, and in America is most destructive in California. Chemical treatment of timber is recommended.



A GRIBBLE.

a, adult isopod (*Limnoria lignorum*); *b*, a piece of wood perforated by its burrows. Greatly magnified.

GRIBEAUVAL, grė′bō̇′vȧl′, JEAN BAPTISTE VAQUETTE DE (1715–89). A French general, born at Amiens and famous for the reforms he inaugurated in the artillery system of his day. In 1732 he joined the Royal Artillery and three years afterward became an officer in the Engineer Corps, devoting himself especially to the study of mines, in which branch of the service he received his captain's rank in 1752. He was the author of a very valuable report to his government concerning the use of light artillery with bodies of infantry (a system then being inaugurated by the Prussian army), together with a complete report concerning Prussian fortifications. In 1757 he entered the Austrian service, serving during the Seven Years' War, in the course of which he directed the siege of Glatz, and held Schweidnitz against Frederick II of Prussia for two months. He was taken prisoner, but afterward was exchanged and was made a lieutenant field marshal. Upon his return to France he began to work for a complete system of reform in the French artillery service. He organized separate corps of artillery for the coast defenses, permanent garrisons, and fortified works, together with mobile units for field service and heavier pieces for siege purposes. Previous to this artillery of varying calibre and design had been indiscriminately scattered throughout the army. Much of Napoleon's success as a tactician and strategist was due to the improvements and reforms rendered possible by

Gribeauval, who not only succeeded in reducing the weight and clumsiness of field artillery, and thus gave to it the mobility which so materially aided Napoleon, but, more important still, brought about a uniformity of design in manufacture, together with many improvements in explosives and projectiles. See ARTILLERY.

GRIBOEDOV, grē′bô-yĕd′ôf, ALEXANDER SERGÉYEVITCH (1795–1829). A Russian dramatic poet and statesman, born at Moscow. His mother gave him the best obtainable education, preparing him for a diplomatic career. By the time he entered Moscow University he knew French, German, English, and Italian, and had studied music both practically and theoretically. On leaving the university he entered military service when Napoleon invaded Russia, but never got to the fighting line and, becoming tired of inaction, resigned in 1816. In 1815 he translated De Lesser's *Secret du ménage* and in 1817 Barth's *Fausses infidelities.* His comedy, *The Woes of Wit,* was read to his friends in 1824; but the censor, finding the play too pointed, did not permit its publication, with the result that the comedy circulated in thousands of manuscript copies. The only performance of the comedy the author ever saw was at a private theatrical in Erivan in 1825, the first public performance taking place two years after his death. Griboedov was commissioned by General Paskievitch to carry on the peace negotiations with Turkey and Persia, and for this service Emperor Nicholas I made him Minister Plenipotentiary at Teheran. There, with 36 others, he was slain, sword in hand, defending the embassy against an unruly mob during an uprising at the Persian capital.

The singular literary merits of his only original comedy, *The Woes of Wit,* give sufficient ground for believing that death cut short the career of one of Russia's greatest poets. The comedy over which he brooded and worked for some 12 years—and which seems to have been suggested by Molière's *Misanthrope*—is a satirical picture of the struggle between two generations in the third decade of the nineteenth century. The characters are endowed with the bold traits typical of all periods of transition, when one part of society desperately clings to the obsolete forms, while the other, in the enthusiasm of reform, is eager to break with the old. But the great vitalizing spirit of the comedy, apart from its masterly character drawing (its hero Chatsky is as good a type as Molière's Alceste) and its stinging satire, is its remarkable style—a style defiant of all canons of dramatic construction—and its still more remarkable language. Thus, despite the meagreness of his dramatic output, Griboedov may be said to have done for the Russian stage what Pushkin had done for Russian poetry.

The best edition of Griboedov's works is that by I. A. Shliapkin, with exhaustive notes and bibliography (St. Petersburg, 1889). For an analysis of the play, consult Goncharov (q.v.), *A Million of Tortures*, vol. ix of collected works (St. Petersburg, 1899). The comedy has been translated into German (1831 and 1853), Polish (1857), English (1857), French (acts iii and iv, 1858), and Georgian. The best German translation, entitled *Verstand schafft Leiden*, is by Dr. Bertram (Leipzig, 1853). The latest in French is by E. Combes, *L'Esprit nuit* (Paris, 1905); in English, by S. W. Pring (London, 1914).

GRID′LEY, CHARLES VERNON (1845–98). An American naval officer, born at Logansport, Ind. He graduated at the United States Naval Academy in 1863, served in the West Gulf blockading squadron in the Civil War, participating in the battle of Mobile Bay (1864), and was assigned to various vessels up to 1875, when he was stationed at the Naval Academy for four years. In 1882 he was commissioned commander. He was navigation officer at the Boston Navy Yard from 1882 to 1884, was inspector of the Tenth Lighthouse District from 1887 to 1891, and served as lighthouse inspector from 1895 to 1897, when he was promoted to be captain and given the command of the *Olympia*, the flagship of the Asiatic Station. He directed his vessel in person, though seriously ill, at the battle of Manila (May 1, 1898) and received the commendation of Admiral Dewey for his skill and courage. He was given sick leave immediately after the engagement, but died, while on his way home, at Kobe, Japan.

GRIDLEY, RICHARD (1711–96). An American soldier, born in Boston. He held the rank of lieutenant colonel of engineers at the first capture of Louisburg in 1745, and took part in several Colonial wars. In 1775, as engineer in chief of the Massachusetts troops at Cambridge, he laid out the fortifications on Breed's Hill, and the next day he commanded the American artillery in the action known as the battle of Bunker Hill. Later he fortified Dorchester Heights and, after the British left Boston, directed the erection of works around the harbor. He was commissioned major general by Congress and commanded the Continental Artillery from September 20 till November, 1775, when he was superseded by Colonel Knox.

GRIEBEN, grē′ben, HERMANN (1822–90). A German journalist and author, born at Köslin and educated at Breslau. He founded the *Pommersche Zeitung* at Stettin in 1853 and in 1859 became one of the editors of the *Kölnische Zeitung.* His works include the tragedy *Es ist zu spät* (1848), the comedy *Drei Monate nach Dato* (1858), other dramatic attempts, and some popular collections of songs, as, e.g., *Rheinische Wanderlieder* (3d ed., 1884). The third edition of his collected poems was published in 1884.

GRIEG, grēg, EDVARD HAGERUP (1843–1907). The greatest of the Scandinavian composers, born at Bergen, Norway, June 15, 1843. He received his earliest musical education from his mother, an accomplished pianist. From 1858 to 1862 he was a pupil of the Leipzig Conservatory, where his teachers were Hauptmann, Richter, Rietz, Reinecke, and Moscheles. On the completion of his studies at Leipzig, in 1862, he went to Copenhagen for a period of study with Gade, whom he determined to emulate, and immediately plunged into a close study of Norse saga literature, legendary lore, folk music, and national melodic characteristics. It was at this period of his development that Rikard Nordraak (q.v.) entered into his life and by his greater insight made clear to Grieg the path of which the latter was in search. Quite a number of vocal romances, the *Humoresken* (op. 6), the E minor piano sonata (op. 7), and the F minor piano and violin sonata (op. 8), are souvenirs of this friendship. The winter of 1865–66 was spent in Rome, after which he made Christiania his home for some years. His residence in the latter city was inaugurated by a concert of Norse music which he gave, and at which Mina Hagerup (whom he later married) sang romances written by Nordraak, Kjerulf, and himself. A stay of a few months in Rome, in 1870, was made possible by the grant of a government stipend. Here he received much encouragement from Liszt, to whom he dedicated his *Foran Sydens Kloster* (from Björnson's *Arnljot*), a work of magnificent power and conception. In 1871 he established the Philharmonic Society of Christiania, which he conducted till 1880. After that time he lived in Bergen, making occasional concert tours of Germany and England. He died suddenly, Sept. 4, 1907, while boarding a steamer which was to take him to London to fill some concert engagements. Grieg's genius is thoroughly individual and finds its happiest expression in the smaller forms. Fully conscious of his limitations, he never allowed the phantom of ambition to cloud his better judgment. In the days of sensationalism, of dazzling orchestral coloring, of striving for mere effect, and of emancipation from form, he steadfastly clung to his ideals and thus preserved his distinctive character. The beauty of his noble melodies—frequently folk songs or themes patterned after them—is enhanced by rich, distinguished harmonies and piquant, varied rhythms. Through all his works there breathes the spirit of freshness and freedom of the wild northern landscape—a quality that would seem to insure the bloom of perpetual youth to the master's compositions. He wrote for orchestra: a concert overture *Im Herbst* (op. 11), Norwegian dances (op. 35), suite *Aus Holberg's Zeit* (op. 40), two suites *Peer Gynt* (op. 46 and 55), *Sigurd Jorsalfar* (op. 56), symphonic dances (op. 64); the beautiful concerto for piano and orchestra (op. 16); the choral works with orchestra *Vor der Klosterpforte* (op. 20), *Landerkennung* (op. 31), *Olaf Trygvason* (op. 50); and some exquisite chamber music. His works for pianoforte, mostly in the smaller forms, are veritable gems, while his songs are recognized as among the most beautiful in all song literature. Consult: E. M. Lee, *Grieg* (London, 1908); Schelderup and Niemann, *Edvard Grieg: Biographie und Würdigung seiner Werke* (Leipzig, 1908); H. T. Finck, *Grieg and his Music* (New York, 1909).

GRIEN (GRÜN), HANS BALDUNG. See BALDUNG, HANS.

GRIEPENKERL, grē′pen-kĕrl, CHRISTIAN (1839–). A German painter, born in Oldenburg. He studied under Rahl in Vienna and, after the success of his picture "Œdipus Led by Antigone," assisted Rahl in the decoration of the Vienna Opera House and other works he had designed. When Rahl died, Griepenkerl and Bitterlich completed some of his undertakings. Then Griepenkerl alone did the decorative paintings in various palaces and in the new Houses of Parliament, all in Vienna, and designed the frescoes in the Academy of Science in Athens. Most of these paintings treated mythological scenes, where his rich fancy had much scope. He also painted a number of portraits. In 1874 he was appointed professor at the Vienna Academy.

GRIEPENKERL, WOLFGANG ROBERT (1810–68). A German dramatist and writer on æsthetics, born at Hofwyl, Switzerland. He was professor of German literature at the Cadet School in Brunswick. During his last 20 years he devoted himself entirely to literary work and public readings of his plays, which include the tragedies *Maximilian Robespierre* (2d ed., 1851), *Die Girondisten* (1852), *Auf Sankt Helena* (1862), and the seriocomedies *Ideal und Welt* (1855) and *Auf der hohen Rast* (1860). These works are distinguished by excellent technique and diction. Consult Sievers, *Robert Griepenkerl* (Wolfenbüttel, 1879).

GRIER, grēr, WILLIAM NICHOLSON (1812–85). An American soldier, born in Pennsylvania. He graduated at the United States Military Academy in 1835, served in many Indian campaigns on the Western border, took an active part in the Mexican War, and in 1848 was brevetted major general for gallantry at the battle of Santa Cruz de Rosales. After additional military service on the frontier he came East at the outbreak of the Civil War and served until the end, and was made lieutenant colonel of the First Cavalry early in 1862. He took part in the Peninsular campaign, was wounded at the battle of Williamsburg, acted as chief recruiting officer in Ohio, Iowa, and Pennsylvania, and in 1865 was brevetted brigadier general of the United States army. The next year he was promoted to be colonel of the Third Cavalry, and he retired in 1870.

GRIERSON, grēr′son, BENJAMIN HENRY (1826–1911). An American cavalry officer, born in Pittsburgh, Pa. At the outbreak of the Civil War he was appointed a major in the Sixth Illinois Cavalry, and he rose to the rank of colonel before April 17, 1863, when Grant sent him on a raid from La Grange, Tenn., to Baton Rouge. In 16 days he led his forces 600 miles, tore up railroads and telegraph lines, completely cutting off Vicksburg's communications with the East, destroyed great quantities of arms and supplies, and then brought his men into Baton Rouge so exhausted that many of them fell asleep in their saddles. For his services on this occasion he was brevetted brigadier general on March 2, 1867, and on the same date was brevetted major general for his services during another raid in 1864. He was commissioned major general of volunteers on Feb. 10, 1865, and the next year was appointed colonel of the Tenth United States Cavalry and assigned to duty in the Southwest. He was retired in 1890 with the rank of brigadier general in the regular army.

GRIERSON, SIR GEORGE ABRAHAM (1851–). An Irish Orientalist, born at Glenageary, County Dublin. He was educated at Shrewsbury and Trinity College, Dublin, and received the degree of Ph.D. from the University of Halle in 1894. In 1873 he entered the Indian Civil Service. His many publications contribute largely to the knowledge of the vernacular languages of India. Among the most important of his works are: *Introduction to the Maithili Language of North Bihar* (1882); *Seven Grammars of the Dialects and Sub-Dialects of the Bihārī Language* (1883–87); "The Modern Vernacular Literature of Hindustan," in *Journal of Asiatic Society*, vol. lvii (1889); his most important work, the editing of the great *Linguistic Survey of India* (9 vols., 1903–08); "An Ahom Cosmogony, with a Translation and a Vocabulary of the Ahom Language," in the *Journal of the Royal Asiatic Society*, pp. 181–232 (1904); *The Piśāca Languages of Northwestern India* (1906); *Manual of the Kāshmīrī Language, Comprising Grammar, Phrase-Book and Vocabularies* (1911).

GRIERSON, SIR ROBERT (c.1655–1733). Laird of Lag and persecutor of the Covenanters. He was a strong supporter of the government, and so loyally did he assist Claverhouse in re-pressing conventicles that he was made justice of the military court at Kirkcudbright in 1681. He enforced the Test Act with thumbscrews and other torture and, in the persecution which followed the act, punished with death refusal to take the oath of abjuration. He was accused of diabolic delight in the torture of his victims. Up to the middle of the nineteenth century his name was preserved in rude country drama, in which his part was that of a bloody monster. On the accession of James II, Grierson was made Baronet and received an annual pension of £200, honors which came close on his condemnation of the "Whigtown martyrs." After the fall of James he was twice seized as a suspect, but was released on bail. For refusing the oath of allegiance (1693) he was frequently arrested and so often fined that he was nearly ruined. He took no active part in "the '15," although his son William was captured at Preston. He was the original of Sir Robert Redgauntlet in Scott's *Redgauntlet*. Consult Fergusson, *Laird of Lag* (Edinburgh, 1885).

GRIES, grēs, Johann Diederich (1775–1842). A German poet and translator. He was born at Hamburg and studied law at Jena, but subsequently devoted himself to literary work and became known for his excellent translations of Italian and Spanish authors. His best translations are of the *Gerusalemme liberata* of Tasso, *Das befreite Jerusalem* (14th ed., 1880); of the *Orlando furioso* of Ariosto, *Der rasende Roland* (4th ed., 1851); and the dramatic works of Calderón (3d ed., 1865).

GRIESBACH, grēs′bȧG, Johann Jakob (1745–1812). A noted New Testament scholar. He was born at Butzbach in Hesse, Jan. 4, 1745, and received his early training in the schools of Frankfort-on-the-Main, where his father was for some time a prominent preacher. In his eighteenth year he began his university course, studying at Tübingen, Halle, and Leipzig. At Halle he was greatly influenced by Semler. After an extended visit to seats of learning in Holland, England, and France, he became a docent in theology at Halle in 1771. In 1773 he was made professor. Two years later he was called to Jena, where he remained until his death in 1812. While a university student, Griesbach became interested in the study of the text of the New Testament, and to the task of collecting material for and elucidating the principles of the textual criticism of the New Testament he devoted his life. His labors mark an epoch in the history of this science. His classification of the ancient authorities for the text, i.e., manuscripts, versions, and citations, into three great families, Alexandrine, Western, and Byzantine, is still recognized as substantially correct. His formulation of the principles according to which the evidence for or against variant readings should be weighed was valuable, though his application of the same was too mechanical. He published several critical editions of the Greek New Testament, of which the second (Halle and London, 1796–1808) is the most important. Of his other writings, his *Symbolæ Criticæ ad Supplendas et Corrigendas Varias Novi Testamenti Lectiones* (1785–93) deserves most attention. Consult S. P. Tregelles, *An Account of the Printed Text of the Greek New Testament* (London, 1854), and Westcott and Hort, *The New Testament in the Original Greek*, introduction and appendix (new ed., ib., 1885).

GRIESINGER, grē′zĭng-ẽr, Karl Theodor (1809–84). A German author. He was born at Kirnbach, Baden, and was educated in the Protestant Theological Seminary at Tübingen. Accused of treasonable utterances published in the *Volkswehr*, a radical journal edited by him during the revolution of 1848, he was imprisoned for two years. From 1852 to 1857 he lived in the United States, and as the fruit of his observations there published the interesting works entitled: *Lebende Bilder aus Amerika* (1858); *Emigrantengeschichten* (1858); *Die alte Brauerei, oder Kriminalmysterien von New York* (3 vols., 1859); *Land und Leute in Amerika* (2d ed., 1863). His descriptions of Swabian life are also popular, while the work entitled *Die Maitressenwirtschaft in Deutschland im 17ten und 18ten Jahrhundert* (1874) is an interesting description of the court life of Germany in former times. His *Sämtlichen belletristischen Werke* appeared in six volumes (1843–44).

GRIESINGER, Wilhelm (1817–68). A German physician. He was born at Stuttgart and was educated at Tübingen, Zurich, and Paris. In 1847 he was appointed associate professor at Kiel and in 1849 professor of pathology. In 1850 he accepted a call to Cairo, Egypt, where he became physician in ordinary to Abbas Pasha, Viceroy of Egypt, and director of the medical school, which positions he held until 1852. During 1852–53 he traveled on the Continent; subsequently he held professorships in Tübingen (1854–60), Zurich (1860–65), and Berlin (1865–68). At Berlin he founded the *Archiv für Psychiatrie und Nervenkrankheiten*. His chief publications include *Pathologie und Therapie der psychischen Krankheiten* (3d ed., 1871) and *Infektionskrankheiten* (2d ed., 1864).

GRIEUX, grē′ẽ′. Le Chevalier de. The hero of Prévost's *Manon Lescaut* and the lover of Manon.

GRIFFENFELD, grĭf′fen-fĕld, Peder Schumacher, Count (1635–99). A Danish statesman, born at Copenhagen, son of a wine merchant of German extraction. He was educated by private tutors, then at the University of Copenhagen, and after his father's death (1650) at Leyden (1655–57) and at Oxford (1657–60). He was a profound student of politics, and on his return to Denmark (1662), after travels in France, Italy, and Germany, he gained the favor of King Frederick III and was appointed head of the privy archives and librarian on the new royal foundation. He was a zealous supporter of the King's claim to absolute power and framed the *Lex Regia Danica*, was in 1671 rapidly advanced under Christian V, was knighted and became Privy Councilor, and two years later the King made him Chancellor and Count of Denmark. But his position and his foreign policy made him rivals and many enemies. He desired Denmark to make an alliance with both France and Sweden, or, if that was impossible, with France alone, since he saw the danger of being at war with both of these nations at once; but he was repeatedly overruled by his opponents. Future events bore out the wisdom of his policy. In 1676 he was charged with bribery and high treason. The death sentence, though pronounced, was not carried out; but he was imprisoned, and gained his freedom only a year before his death.

GRIF′FIN. A city and the county seat of Spalding Co., Ga., 43 miles south of Atlanta, on the Central of Georgia and the Southern railroads (Map: Georgia, B 2). It has several cotton mills and extensive manufactures of Turkish towels. A State agricultural experiment station and a test farm of the Central of Georgia Railroad are situated here. The water works and electric plant are owned by the city. Pop., 1900, 6857; 1910, 7478.

GRIFFIN (from OF. *grifon*, Fr. *griffon*, ML. *grypho*, from Lat. *gryphus*, griffin, variant of *gryps*, from Gk. *γρύψ*, *gryps*, griffin, from *γρυπός*, *grypos*, hook-nosed; confused by popular etymology with Gk. *γύψ*, *gyps*, vulture). A fabulous creature, half animal, half bird, imagined by the ancients. It was usually described in literature and represented in art as having the head, beak, and wings of an eagle and the body and legs of a lion; sometimes it has the head of a leopard or tiger, with horns. This creature was conceived by the peoples of the valley of the Tigris and the Euphrates as one of the chimerical genii or natural forces in the service of the powers of good. Like the bull and the lion, it was either animal-headed or human-headed, but less material than these; and, like them, it was a guardian and protector of man and the treasures of earth. Among the Babylonians its evil counterpart was the dragon Tiamat. In Assyrian sculpture it is represented in colossal size on a slab from Koyunjik in the British Museum and in the embroidered figures on the royal robes. It was even more popular in Persian art, being given as rampant, with high crest, on reliefs from the royal palaces (e.g., Persepolis), and on cylinders and seals.

Thence the myth passed to the Ægean peoples and to the Greeks as well as to the Hittites and the Egyptians. The griffin appears on the battle-axe of King Amasis, in Syrian and Phœnician gems, and on bas-reliefs from Mycenæ. The form of the legend in historic Greek times betrays its Oriental derivation. It appears on the great bronze Phœnician shields from Mount Ida in Crete, on the imported Phœnician and Greek objects in early Italian graves, on Corinthian vases—usually in a long procession of griffins. It is recorded that griffins formed part of the decoration of the bronze patera ordered by the Samians (c.640 B.C. Consult Herodotus, iv, 152). Later it appeared on the helmet of Phidias' famous statue of Athena. It was also connected by the Greeks with other deities, such as Dionysus and Nemesis, but especially with the twin gods Artemis and Apollo. Artemis, in her form as adapted from the Persians, holds in each hand a griffin, on archaic Greek vases and on archaistic sculptures such as the throne in the Dionysus Theatre at Athens. Even more close was the association with the sun god, Apollo, whose chariot the griffin is often represented as drawing, especially in that form of his myth which represents him as withdrawing each year to the regions of the north. The early Greek writers, such as Hesiod and Aristeas, describe the griffins as dwelling in the Rhipæan mountains at the north, near the Hyperboreans and the evil one-eyed Arimaspeans, who, mounted on horses, seek to seize the treasure of gold guarded by the griffins. At a later period the scene of this guarding of the gold was transferred to India. This idea of guardianship was transferred to other spheres, and we find griffins on sarcophagi as keepers of the dead. Many Greek cities of Asia Minor adopted them as types on their coins, as guardian genii of the city, such as Assos, Smyrna, Panticapæum, and Phocæa, evidently under Persian influence.

The Romans lost the poetry and significance of the myth, using the griffin as a mere decorative *motif*, in friezes, on table legs, altars, and candelabra, as well as in wall paintings. But the symbolism was never entirely lost in the East and reappeared in Christian times in the Bestiaries (q.v.), so called, of St. Basil and St. Ambrose, as part of the peculiar animal symbolism that penetrated the Middle Ages. The heraldic affronted griffins were common in Mohammedan, in Persian, and in Byzantine art—especially in stuffs, ivories, and metal work—passing to the West in the Middle Ages, as is shown, e.g., in many Anglo-Saxon illuminated manuscripts. The legend itself was transformed by Moslem story-tellers, and the form it took is related by those incomparable story-tellers, Marco Polo and Sir John Mandeville, who describe the griffin as a real creature, whose home is in Madagascar, in the form of a powerful and colossal eagle, several times (eight times, says Mandeville) the size of a lion, which it could lift into the air.

The Renaissance rehabilitated the classic form of the griffin, using it, like Roman art, for decorative purposes very freely. It also became popular on family arms and heraldic devices, especially in Great Britain, with the old idea of guardianship; several hundred families (especially in Wales) adopted it as their emblem, but usually replaced the forepaws of the lion by the eagle's claws. (See Heraldry, *Common Charges.*) In a few instances the griffin ends in a serpent's tail. The attributes of the griffin were swiftness and strength in the service of watchfulness.

GRIFFIN, Charles (1826–67). An American soldier, born in Licking Co., Ohio. He graduated at West Point in 1847 and served in the Mexican War, at the close of which he was assigned to duty on the frontier. On the outbreak of the Civil War he joined the Army of the Potomac and commanded the Fifth Artillery at the first battle of Bull Run. He was made a brigadier general of volunteers in 1862 and took part in most of the important battles fought by the Army of the Potomac during the following campaigns. On May 6, 1864, he was brevetted lieutenant colonel for services at the Battle of the Wilderness, and in August of the same year he received the brevet rank of major general of volunteers. Nine months later he was given the actual rank of major general of volunteers. After the surrender at Appomattox he received the arms and colors of the Confederate army and was one of the commission appointed to carry out the conditions agreed to by Grant and Lee. In 1866 he was appointed colonel of the Thirty-fifth Infantry and was assigned to duty in the Southwest, where he died.

GRIFFIN, Edward Herrick (1843–). An American educator, born at Williamstown, Mass. He graduated at Williams College in 1862 and at Union Theological Seminary in 1867. He was professor at Williams College from 1872 to 1889, when he was appointed professor of the history of philosophy and dean of the college faculty in Johns Hopkins University.

GRIFFIN, Francis Vielé-. See Vielé-Griffin, Francis.

GRIFFIN, Gerald (1803–40). An Irish novelist, poet, and dramatist, born in Limerick. He did some newspaper work in Limerick and at the age of 20 went to London. He contributed to periodicals and published novels, some of which met with success. Among them are: *Holland Tide*, the first of three series of *Tales of the Munster Festivals* (1827); *Tales of Munster Festivals* (2d series, 1829; 3d series, 1832); *The Collegians* (1829), one of the best novels of Irish life, of which an edition, illustrated by Phiz, appeared in 1861 under the title of *Colleen Bawn;* and *Tales of my Neighborhood* (1835). About 1838 he entered the Catholic Society of Christian Brothers, among whom he died. His play *Gisippus*, declined in his lifetime by Charles Kean and others, was produced in 1842 by Macready and Helen Faucit. He has written lyrics of rare tenderness and charm, witness his "Eileen Aroon." An edition of his novels and poems, with a biographical sketch by his brother, was published in eight volumes in 1842–43, and his *Poetical and Dramatic Works* were issued in 1857–59. Consult a sketch in Mitford, *Recollections of a Literary Life* (London, 1859), and H. S. Krans, *Irish Life in Irish Fiction* (New York, 1903), for critical estimate of his work.

GRIFFIN, Martin Joseph (1847–). A Canadian journalist and librarian. He was born in St. John's, Newfoundland, but, early removing to Halifax, Nova Scotia, was educated there at St. Mary's College. He practiced law for several years after 1868, then, going into journalism, served first on the Halifax *Chronicle.* In 1868–74 he was editor of the Halifax *Express* and in 1879–81 was editorial representative at Ottawa of the Toronto *Mail*, of which paper he was editor in chief in 1881–85. He became Secretary of the Royal Commission to inquire into the condition of the Canadian civil service (1880) and parliamentary librarian at Ottawa (1885). Besides contributing frequently to the leading magazines of America and Britain, he became known as a literary critic. In 1907 he was made Companion of the Order of St. Michael and St. George.

GRIFFIN, Robert Stanislaus (1857–). An American naval officer, born at Fredericksburg, Va. He entered the United States Naval Academy as a cadet engineer in 1874 and graduated in 1878. During the Spanish War he served on the U.S.S. *Mayflower* in the West Indies and in 1899 was transferred to the line as a lieutenant. In 1903 he was fleet engineer of the European squadron and in 1904–05 fleet engineer of the North Atlantic fleet. His shore duty was chiefly performed in the Bureau of Steam Engineering, Navy Department, and much credit for recent improvements in naval engineering *matériel* and practice is due to him; he was assistant chief of bureau for several years and in 1913 was appointed chief of the bureau and engineer in chief of the navy with the rank of rear admiral. In 1889, 1894, and 1895 he was secretary of the American Society of Naval Engineers, and in 1908, 1912, and 1913 president. He is the author of numerous articles on technical subjects connected with marine engineering.

GRIFFIN, Simon Goodell (1824–1902). An American soldier and legislator, born at Nelson, N. H. He represented his town in the State Legislature and was admitted to the bar in 1860. During the Civil War, as colonel of the First Brigade, Second Division, Ninth Army Corps, he aided Grant in the siege of Vicksburg and participated in Sherman's Mississippi campaign of 1864. He commanded the Second Brigade, Second Division, in the Battle of the Wilderness, and at Spottsylvania was brevetted brigadier general of volunteers in 1864, on the recommendations of Generals Burnside and Grant. For gallantry at the sieges of Petersburg and around Richmond he was brevetted major general of volunteers in 1865. After the war he lived in Keene, N. H. He was elected five times to a seat in the New Hampshire Legislature and served in the last two terms as Speaker.

GRIFFIN, Walter Burley (1876–). An American landscape architect, born at Maywood, Ill. He graduated as B.S. in Architecture from the University of Illinois in 1899 and thereafter was engaged in the practice of landscape architecture, at first as assistant and junior partner, but independently after 1905. His work comprised especially the planning of many private and public grounds and buildings, also town and city planning. In 1912 he won first prize from the government of Australia in the international competition for the designs for a new federal capital, Canberra, and in 1913 he was placed in charge of the work. He is author of articles on architecture and city planning.

GRIF'FIS, William Elliot (1843–). An American clergyman, educator, and author, born in Philadelphia. He served with the Forty-fourth Pennsylvania Regiment in the Civil War and then entered Rutgers College, where he graduated in 1869. After one year of study at the Dutch Reformed Theological Seminary at New Brunswick, N. J., he accepted an appointment to organize schools on the American model in Japan and was the first American teacher in regions beyond the open ports. On the fall of the feudal system and the unification of the Empire, he was appointed professor of the physical sciences in the Imperial University of Tokyo. He prepared the *New Japan Series* of reading and spelling books and primers for Japanese students in the English language and contributed to the Japanese press and to newspapers and magazines in the United States numerous papers of importance on Japanese affairs. In 1874 he returned to New York, where he finished his theological studies at Union Theological Seminary, and in 1877 was made pastor of the First Reformed Church in Schenectady, N. Y.; in 1886, of the Shawmut Congregational Church in Boston; and in 1893, of the Congregational Church in Ithaca, N. Y. After 1903 he was chiefly engaged in literary work. He wrote: *The Mikado's Empire* (1876); *Japanese Fairy World* (1880); *Asiatic History* (1881); *Corea, the Hermit Nation* (1882); *Sir William Johnson and the Six Nations* (1891); *Matthew Galbraith Perry* (1887); *The Lily among Thorns* (1889); *Honda, the Samurai* (1890); *Japan—in History, Folklore, and Art* (1892); *Brave Little Holland, and What She Taught Us* (1894); *The Religions of Japan* (1895); *Townsend Harris, First American Envoy to Japan* (1895); *The Pilgrims in their Three Homes—England, Holland, and America* (1898); *America in the East* (1899); *The American in Holland* (1899); *Verbeck of Japan* (1900); *The Pathfinders of the Revolution* (1900); *Dux Christus: An Outline Study of Japan* (1904); *China's Story in Myth, Legend, Art, and Annals* (1910); *The Unmannerly Tiger and Other Korean Tales* (1911); *A Modern Pioneer in Korea* (1912); *Hepburn of Japan* (1913).

GRIF'FITH, Francis Llewellyn (1862–). An English Egyptologist, born in Brighton and educated at Queen's College, Oxford. Between 1884 and 1888 he worked in Egypt under Naville and Flinders Petrie. In 1888–96 he was an assistant in the British Museum; in 1892–1901 assistant professor of Egyptology at University College, London; in 1896–1908, lecturer at the University of Manchester; and, after 1901, reader in Egyptology at Oxford. In 1910 he took charge of the Oxford excavations in Nubia. He published: *The Inscriptions of Siût and Der Rifeh* (1889); *Hieratic Papyri from Kahûn and Gurob* (1898); *Stories of the High Priests of Memphis* (1900); *Demotic Magical Papyri* (1904–09), with Sir Herbert Thompson; *Catalogue of Demotic Papyri in the Rylands Library* (1909); *Meroitic Inscriptions* (1911 et seq.).

GRIF′FITH, Ralph Thomas Hotchkin (1826–1906). An English philologist and Sanskrit scholar, born at Corsley, Wiltshire. He was educated at Queen's College, Oxford, and then engaged in educational work in India. From 1863 until 1878 he was principal of the Benares College, and from that year until 1885 he was Director of Public Instruction in the Northwest Provinces. His publications on Oriental literature include: *Specimens of Old Indian Poetry* (1852); *The Birth of the War God* (1853); *Idylls from the Sanskrit* (London, 1866); *The Rāmāyan of Valmiki* (5 vols., 1870–75; reprinted in 1 vol., 1895); *Yūsuf and Zulaikha* (1882); *The Hymns of the Rig Veda, Metrically Translated into English* (4 vols., 1889–92); *The Sāma Veda* (trans., 1893); *The Atharva Veda* (1895–96); *The Texts of the White Yajur Veda* (trans., 1899).

GRIFFITH, Sir Richard John (1784–1878). An Irish geologist and civil engineer, born in Dublin. He studied under William Nicholson in London and under Robert Jameson at Edinburgh. He returned to Ireland in 1809 to examine and report to the government on the bogs of Ireland. In 1812 he became professor of geology and mining engineer for the Royal Dublin Society. Between 1822 and 1830 he supervised the construction or improvement of some 250 miles of roads in Ireland, and from 1827 to 1868 served as commissioner of valuation. He was made Baronet in 1858. He published, besides the first important *Geological Map of Ireland* (1815; rev. eds., 1836 and 1855), *Outline of the Geology of Ireland* (1838); *Fossils of the Mountain Limestone of Ireland* (1842); *A Synopsis of the Characters of the Carboniferous Limestone Fossils of Ireland* (1844), with F. McCoy; *A Synopsis of the Silurian Fossils of Ireland* (1846), with F. McCoy.

GRIFFITH, William Pettit (1815–84). An English architect and archæologist, born in London. He attained considerable eminence in his profession and designed several hospitals and schools in London. Among his writings are: *The Geometrical Proportion of Architecture* (1843); *The Natural System of Architecture* (1845); *Ancient Gothic Churches* (3 parts, 1847–48–52); *Suggestions for a More Perfect and Beautiful Period of Gothic Architecture* (1855).

GRIFFITH GAUNT, or Jealousy. A novel by Charles Reade, which appeared serially in the *Argosy* and was published in 1866.

GRIF′FITHS, David (1867–). An American botanist. He was born at Aberystwith, Wales, and graduated from the Agricultural College, Brookings, S. Dak., in 1892, and from Columbia University (Ph.D.) in 1900. He taught in the South Dakota schools from 1889 to 1898, was professor of botany at the University of Arizona in 1900–01, and served as assistant agrostologist in 1901–07 and as agriculturist after 1907 in the United States Department of Agriculture. His publications include bulletins of the Department of Agriculture on forage and range conditions in the Western States, and a monograph on the North American Sordariaceæ.

GRIFFITHS, Ernest Howard (1851–). A British physicist. He was born in Brecon and was educated at Owens College, Manchester, and at Sidney Sussex College, Cambridge, of which, as of Jesus College, Oxford, he became fellow. In 1901 he was made professor of experimental philosophy and principal of the University College of South Wales and Monmouthshire. He devised an important modification of "Wheatstone's bridge," in 1893 used an electrical method to determine the mechanical equivalent of heat, and in 1907 received the Royal Society's Hughes gold medal for his work on exact physical measurements. His Leeds lectures, *The Thermal Measurement of Energy,* were published in 1901.

GRIFFITHS, John Willis (1809–82). An American naval architect, born in New York City. He designed and built many merchant vessels, some war vessels for the United States navy, and introduced many innovations in the art of shipbuilding, his inventions including a timber-bending machine, iron keelsons for wooden ships (1848), bilge keels (1863), and triple screws (1866). He wrote a number of books on naval architecture, the most important of which, *A Treatise on Marine and Naval Architecture* (2 vols., 1850; 4th ed., 1854), was republished in England. His other works were *The Shipbuilder's Manual* (2 vols., 1853) and *The Progressive Shipbuilder* (2 vols., 1875–76).

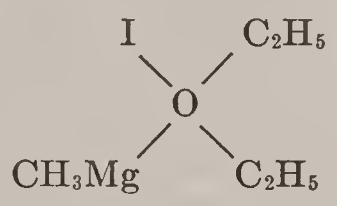
GRIF′FON. A dog. See Field Dog.

GRIGGS, Edward Howard (1868–). An American lecturer and writer. He was born at Owatonna, Minn., and in 1889 graduated from Indiana University (A.M., 1890), where he was instructor in English literature in 1889–91 and professor of literature in 1892–93. He also studied at the University of Berlin. At Leland Stanford he was assistant professor of ethics in 1891–92, professor of ethics in 1893–97, and head of the department of ethics and education in 1897–98. After 1899 he became known as a lecturer. His works include: *The New Humanism* (1900); *A Book of Meditations* (1902); *Moral Education* (1904; 6th ed., 1913); *The Use of the Margin* (1907); *Art and the Human Spirit* (1908); *Human Equipment* (1909); *The Philosophy of Plato* (1910); *Human Progress* (1912); *The Philosophy of Art* (1913); *Self-Culture through the Vocation* (1914).

GRIGGS, John William (1849–). An American politician, born in Newton, N. J. He graduated at Lafayette College in 1868, was admitted to the bar in 1871, was appointed city counsel of Paterson, N. J., and became a bank president. He was elected to the General Assembly in 1875 and was a State Senator from 1882 to 1888. During the year 1886 he presided over the New Jersey Senate. In 1895 he was elected Governor of New Jersey, but resigned the office on Jan. 31, 1898, to accept the position of Attorney-General in President McKinley's cabinet, which he held until his resignation in April, 1901. In the latter year he became a member of the Permanent Court of Arbitration at The Hague.

GRIGNARD, grē′nyȧr′, VICTOR (1871–). A French chemist, born at Cherbourg. He was educated at the lycée of his native city, at the Cluny Ecole Normale, and at the University of Lyons, where he became doctor of science in 1901. In his doctor's thesis he demonstrated the discovery of new organometallic compounds of magnesium that were easily obtained and proved to be of great value in synthetic chemistry. These researches earned him half of the Nobel prize in chemistry for 1912. He lectured at Besançon in 1905, taught at Lyons in 1906–09, and took charge, in 1909, of a course at Nancy, where he became full professor in the following year. He is author of a number of memoirs, published in various chemical journals. See GRIGNARD REACTION.

GRIGNARD REACTION. A remarkable synthetic method of organic chemistry, discovered in 1900 by V. Grignard (working at first under the direction of Professor Barbier), and since extensively used for the artificial preparation of a great variety of organic compounds. It is based on the fact that when an organic halogen compound, like methyl iodide (CH_3I), is brought into contact with metallic magnesium in the presence of dry ether, the magnesium combines chemically with the halogen compound, and almost certainly also with the ether, forming a complex substance that is soluble in the excess of ether employed and that readily interacts with compounds of various classes. The union of the halogen compound with magnesium may be undoubtedly represented by formulæ like $CH_3{-}Mg{-}I$, which shows the mode of linking of the atoms in the molecule of methyl-magnesium iodide. How such a metallo-organic compound further unites with ether is less clear; nor is it fully established whether one metallo-organic molecule unites with one or with two molecules of ether. Most chemists assume, with Baeyer, that only one molecule of ether is involved, and that the union takes place through the oxygen of the ether, which becomes quadrivalent ("oxonium oxygen"), as shown by the formula:



In 1904 Baeyer showed that the active complex, whatever its true formula, is formed much more readily if the powdered magnesium employed is previously heated with a small amount of iodine. After the complex—the "Grignard reagent," as it is often called—has interacted with the substance which it is desired to transform, the entire mixture is thrown into cold water acidified with acetic or sulphuric acid, and the product, now free from magnesium, is purified as usual. In formulating the Grignard reagents below, the ether molecule will be omitted, for simplicity's sake. How substances of different classes are prepared by the Grignard reaction may best be illustrated by a set of typical examples.

1. Let the problem be to prepare marsh gas from wood alcohol: the alcohol is changed to methyl iodide, the latter is "grignardized," and the product is brought into contact with acidulated water, the result being an evolution of all but perfectly pure marsh gas, produced according to the equation:

$$\underset{\text{Methyl-magnesium iodide}}{CH_3MgI} + HOH = \underset{\text{Marsh gas}}{CH_4} + \underset{\text{Magnesium hydroxy-iodide}}{Mg(OH)I}$$

This may suffice here as an example of the production of *hydrocarbons.*

2. The Grignard reaction may be employed for preparing all kinds of *alcohols* (q.v.)—primary, secondary, and tertiary, monatomic and polyatomic, fatty and aromatic. For instance, ordinary ethyl alcohol, a fatty monatomic *primary alcohol,* might be expected from the action of methyl-magnesium iodide upon formaldehyde:

$$CH_3MgI + \underset{\text{Formaldehyde}}{HCHO} = HCH(CH_3)OMgI$$

$$HCH(CH_3)OMgI + H_2O = \underset{\text{Ethyl alcohol}}{CH_3CH_2OH} + Mg(OH)I$$

Benzo-hydrol, an aromatic *secondary alcohol,* has been made from phenyl-magnesium iodide and benzaldehyde, as shown by the following equations:

$$\underset{\text{Phenyl-magnesium iodide}}{C_6H_5MgI} + \underset{\text{Benzaldehyde}}{C_6H_5CHO} = C_6H_5CH(C_6H_5)OMgI$$

$$C_6H_5CH(C_6H_5)OMgI + H_2O = \underset{\text{Benzo-hydrol}}{(C_6H_5)_2CHOH} + Mg(OH)I$$

Secondary alcohols may also be made from the esters of formic acid, the latter being used, for the purpose, in moderate quantities. For instance, secondary amyl alcohol may be prepared according to the equations:

$$\underset{\text{Ethyl formate}}{HCOOC_2H_5} + \underset{\text{Ethyl-magnesium bromide}}{C_2H_5MgBr} = HC(OMgBr)(C_2H_5)\text{-}OC_2H_5$$

$$HC(OMgBr)(C_2H_5)OC_2H_5 + C_2H_5MgBr = HC(OMgBr)(C_2H_5)_2 + \underset{\text{Ethoxy-magnesium bromide}}{Mg(OC_2H_5)Br}$$

$$HC(OMgBr)(C_2H_5)_2 + H_2O = \underset{\text{Secondary amyl alcohol}}{(C_2H_5)_2CHOH} + \underset{\text{Magnesium hydroxy-bromide}}{Mg(OH)Br}$$

Tertiary alcohols may be prepared either from ketones or from esters of acids other than formic. Thus, phenyl-dimethyl carbinol, a tertiary aromatic alcohol, has been made from acetophenone (a ketone) as follows:

$$\underset{\text{Aceto-phenone}}{C_6H_5COCH_3} + CH_3MgI = C_6H_5C(OMgI)(CH_3)_2$$

$$C_6H_5C(OMgI)(CH_3)_2 + H_2O = \underset{\text{Phenyl-dimethyl carbinol}}{C_6H_5C(CH_3)_2OH} + Mg(OH)I$$

On the other hand, methyl-diethyl carbinol, a tertiary fatty alcohol, may be obtained from ordinary ethyl acetate according to the equations:

$$\underset{\text{Ethyl acetate}}{CH_3COOC_2H_5} + C_2H_5MgBr = CH_3C(OMgBr)\text{-}(C_2H_5)OC_2H_5$$

$$CH_3C(OMgBr)(C_2H_5)OC_2H_5 + C_2H_5MgBr = CH_3C(OMgBr)(C_2H_5)_2 + Mg(OC_2H_5)Br$$

$$CH_3C(OMgBr)(C_2H_5)_2 + H_2O = \underset{\text{Methyl-diethyl carbinol}}{CH_3(C_2H_5)_2OH} + Mg(OH)Br$$

As an example of the preparation of a *diatomic alcohol,* or glycol, may be mentioned the synthesis of ordinary pinacone from ethyl oxalate (the ester of a dibasic acid) and methyl-magnesium iodide, which may be carried out as follows:

$$\underset{\text{Ethyl oxalate}}{C_2H_5OCO \cdot COOC_2H_5} + 2CH_3MgI = C_2H_5OC(OMgI)(CH_3) \cdot C(OMgI)(CH_3)OC_2H_5$$

$$C_2H_5OC(OMgI)(CH_3) \cdot C(OMgI)(CH_3)OC_2H_5 + 2CH_3MgI = (CH_3)_2C(OMgI) \cdot C(OMgI)(CH_3)_2 + 2Mg(OC_2H_5)I$$

$$(CH_3)_2C(OMgI) \cdot C(OMgI)(CH_3)_2 + 2H_2O = \underset{\text{Pinacone}}{(CH_3)_2C(OH) \cdot C(OH)(CH_3)_2} + 2Mg(OH)I$$

3. The use of the Grignard reaction for the preparation of *aldehydes* may be illustrated by the single example of the transformation of phenyl-magnesium iodide into benzaldehyde. In general, aldehydes are produced when a given Grignard reagent is brought into contact with an *excess* of an ester of formic acid (a *moderate* quantity of ester producing, not an aldehyde, but, as stated above, a secondary alcohol). Benzaldehyde is formed according to the equation:

$$C_6H_5MgI + \underset{\text{Ethyl formate (excess)}}{HCOOC_2H_5} = \underset{\text{Benzaldehyde}}{C_6H_5CHO} + \underset{\text{Ethoxy-magnesium iodide}}{Mg(OC_2H_5)I}$$

4. The preparation of aceto-phenone (whose transformation into a tertiary alcohol was mentioned above) may serve as an example of the Grignard synthesis of *ketones* from organic cyanides (nitrils):

$$\underset{\text{Benzo-nitril}}{C_6H_5CN} + CH_3MgI = C_6H_5C(CH_3):N \cdot MgI$$

$$C_6H_5C(CH_3):N \cdot MgI + H_2O = C_6H_5C(CH_3):NH + Mg(OH)I$$

$$C_6H_5C(CH_3):NH + H_2O = \underset{\text{Aceto-phenone}}{C_6H_5(CO)CH_3} + NH_3$$

5. Finally, it may be shown how an *acid*, e.g., benzoic acid, may be prepared by the Grignard reaction. First, dry carbon dioxide is introduced into the Grignard reagent, and then the resulting intermediate product is decomposed with acidified water, as usual:

$$C_6H_5MgI + CO_2 = \underset{\text{Magnesium benzo-iodide}}{C_6H_5CO_2MgI}$$

$$C_6H_5CO_2MgI + H_2O = \underset{\text{Benzoic acid}}{C_6H_5CO_2H} + Mg(OH)I$$

The above examples will suffice to indicate the great flexibility of the reaction and its extraordinary possibilities in preparative organic chemistry.

GRIGOROVITCH, grē'gŏ-rô'vĭch, Dmitry Vassilievitch (1822–1900). A Russian novelist of the period of Turgenev, Goncharov, and Dostoevsky (qq.v.). He was born in the Province of Simbirsk. His education was directed by his mother and grandmother and was decidedly French in tone. He studied at the St. Petersburg School of Engineering, tried the stage and painting, but found his true vocation in literature. His first two novels, *The Village* (1846) and *Anton Goremayka* (1847), made his reputation. In both peasant life is depicted very vividly and sympathetically. Especially noteworthy is the attention drawn in them, for the first time in Russian literature, to the heartrending abuses of serfdom. Next to the two works already mentioned, his best novels are *The Fishermen* (1852) and *The Emigrants* (1855). All these novels have exercised a profound influence on Russian life and literature. After these very successful works the author devoted himself to art, for which he always had a strong predilection. When after a lapse of 30 years he returned to literature, he chose his characters from townfolk, but with little success. Grigorovitch's complete works have been repeatedly published, last in 1896.

GRIJALVA, grē-Häl'vȧ (named in honor of its discoverer, Juan de Grijalva). A river of southeast Mexico, rising in Guatemala, flowing first to the northwest and then to the northeast under various names through the states of Chiapas and Tabasco, and after a course of nearly 300 miles emptying into the Gulf of Campeche (Map: Mexico, M 9). It is navigable for small steamers for about 50 miles up to San Juan Bautista.

GRIJALVA, Juan de (c.1489–1527). A Spanish explorer, born at Cuellar (Old Castile). His uncle, Diego Velázquez, Governor of the island of Fernandina (Cuba), sent him to explore Mexico and Yucatan, where he discovered, in 1518, the river now bearing his name. He took possession of all that country in the name of the Emperor Charles V and christened it New Spain. Despite the value of these discoveries, he was not rewarded upon his return to Cuba, but was dismissed from the Governor's service for not founding colonies in the country he had explored, and was killed afterward in Nicaragua. Consult: Juan Díaz, "Itinerario" (the original account of Grijalva's voyage), published in Icazbalceta, *Colección de documentos para la historia de Méjico* (Mexico, 1858); Díaz del Castillo, *True History of the Conquest of New Spain*, issued by the Hakluyt Society (London, 1910–12); Bancroft, *History of Mexico* (San Francisco, 1883).

GRIL'LAGE BEAMS. See Foundations.

GRILLET, grē'yȧ', Jean (c.1630–c.1676). A Jesuit missionary and explorer, born in France. In 1666, when the English took Guiana, he was superior of the Jesuit house in Cayenne, but, unlike many of his fellow colonists, did not take refuge among the Indians. A few years later he was sent on a mission to get information concerning the geography of the interior and the customs and civilization of the tribes most distant from the sea. Accompanied by Father François Béchamel, who understood the Galibi language, Father Grillet set out on Jan. 25, 1674. He succeeded in reaching a point about 570 miles southwest of Cayenne, in the country of the Acoquas, a tribe who had never before seen a white man. The two Jesuits returned to Cayenne on June 17, and Grillet sent an account of their journey to France. This account was published afterward under the title *Journal du voyage qu'ont fait les pères Jean Grillet et François Béchamel dans la Guyane, l'an 1674.* It was republished in the second volume of Gomberville's *Relation de la rivière des Amazons* (1679–80) and in Roger's *Voyage around the World* (Amsterdam, 1716). Both of the explorers died soon after their return to Cayenne as a result of the hardships they had undergone.

GRILLPARZER, grĭl'pär-tsẽr, Franz (1791–1872). The greatest Austrian dramatist of modern times. He was born in Vienna, Jan. 15, 1791. His conscientious but unfeeling father, a lawyer, died in 1809, leaving the family needy. His mother, an affectionate but eccentric and morbidly sensitive woman, talented in music, committed suicide in 1819. After an unsympathetic schooling at home Grillparzer studied law in Vienna (1807–11), without making a brilliant success. Afterward he made himself familiar with French, English, Italian, and Spanish. In 1813 he entered government service in the financial department, in 1832 he was put over the archives, in 1847 he became a member of the Academy of Sciences, and in 1856 he retired. If we add to what has been said the fact that Grillparzer was once betrothed to Kathi Fröhlich, whom he first loved, always liked, but never wedded; that he visited Italy in 1819, France and England in 1838, and went to Turkey and Greece in 1843, and finally that he died, honored by all Europe, on the 21st of January, 1872, we know the most striking external incidents in his life.

In German literature he is a link between Goethe, Herder, Schiller, and Lessing, who helped to shape his ideals, and a more modern school. His style is limpid, his verse smooth but virile, his painting of character, especially feminine, masterly. Grillparzer was catholic in his theatrical likings. The suburban theatres pleased him, but he was also a methodical student of Haydn, Mozart, and Beethoven. In 1807–09, under the influence of Schiller's *Don Carlos,* he wrote a drama, *Blanca von Kastilien;* later he turned to Goethe and Shakespeare. *Die Ahnfrau,* a fate tragedy (although Grillparzer denied it), was played first at Vienna (1817) and afterward aroused enthusiasm throughout Germany, but caused the critics to class Grillparzer with Zacharias Werner and Adolph Müllner. This long vexed the poet. His tragedy *Sappho* (1818) made him famous and remains one of his best dramas. In 1822 followed *Das goldne Vlies,* the second greatest trilogy in German literature, which as a stage play, however, fell somewhat flat. This failure Grillparzer laid to the oppressive rule of Metternich. In *König Ottokars Glück und Ende* the dramatist portrayed the rivalry between Rudolph of Hapsburg and Ottokar of Bohemia. For two years the censor kept this play waiting, on the ground that it was unseemly to put the founder of the dynasty on the stage. Thanks to the Empress, the piece was played with great success in 1824. After the cool reception of the tragedy *Ein treuer Diener seines Herrn* (1828) Grillparzer held aloof from the stage for 10 years. On the refusal of *Wehe dem der lügt,* a comedy (1838), Grillparzer was utterly disheartened. *Der Traum ein Leben* (1834), after *La vida es sueño,* by Calderón, a dramatic tale, is played still with success in Germany. *Des Meeres und der Liebe Wellen* (1840) handles the theme of Hero and Leander. In 1850 the public seemed to be eager for the poet's reappearance, but he said "Too late" and would not be persuaded. Consult: Sauer's Biographical Introduction to Grillparzer's *Collected Works* (Stuttgart, 1892); the *Jahrbuch* of the Grillparzer Gesellschaft (Vienna, 1890 et seq.); Traube, *Grillparzer's Lebensgeschichte* (Stuttgart, 1884); Littrow-Bischoff, *Aus dem persönlichen Verkehr mit Franz Grillparzer* (Vienna, 1873); Lange, *Grillparzer, sein Leben, Dichten und Denken* (Gütersloh, 1894); Friedmann, *Il dramma tedesco del nostro secolo,* vol. iii (Milan, 1893); Sittenberger, *Grillparzer, sein Leben und Wirken* (Berlin, 1903); Ehrhard, *Franz Grillparzer; Le théâtre en Autriche* (Paris, 1900); Volkelt, *Grillparzer als Dichter des Tragischen* (München, 1888).

GRILSE, grĭls (Scot. also *gilse,* cf. Ir. *greal sach,* sort of fish). A British name for a young salmon, on its first return from the sea, when it weighs from two to six pounds.

GRIM. The fisherman who, in Arthurian legend, saves the youthful Havelok from a watery grave, rears him as his son, and with the royal reward of his good deed founds the town of Grimsby. The story is told in *The Lay of Havelok the Dane.*

GRIMALDI, grē-mäl′dē. A celebrated family of Genoa, members of which were princes of Monaco for several centuries down to 1731. They were stanch supporters of the Guelph interests in Genoa and Italy generally and opposed the Dorias and other Ghibelline families. The most eminent members of the Grimaldi family were: Rainerio, Admiral of France, who commanded a fleet in the service of Philip the Fair of France in 1304, defeating and making prisoner Guy of Flanders.—Antonio, distinguished in naval warfare in the early part of the fourteenth century. He was successful against the Catalans, but in 1353 was completely defeated by Nicolò Pisani, commanding a Venetian and Aragonese fleet off the coast of Sardinia.—Domenico, like the others, distinguished at sea, especially in the battle of Lepanto, Oct. 7, 1571. He became Cardinal and Vice-Legate of Avignon and was noted for his efforts to exterminate heresy.—Geronimo (1579–1685), Cardinal, was celebrated for his attempt to reform the morals of the clergy. He founded a hospital for the poor and distributed great sums in alms. In 1731 the male line of Grimaldi became extinct, and the Principality of Monaco passed to the kindred house of Goyon-Matignon, who assumed the name Grimaldi. Consult: Pierlas, *Monuments inédits sur les Grimaldi de Monaco* (Turin, 1885); Saige, *Monaco, ses origines et son histoire* (Monaco, 1897); De Jolans, *Histoire et généalogie des Grimaldi* (Nice, 1900).

GRIMALDI, Giovanni Francesco (called Il Bolognese) (1606–80). A Bolognese architect, painter, and etcher. He was a relative and pupil of the Carracci. He practiced in Rome both as an architect and as a painter under the patronage of Paul V, Innocent X, and their successors, and in Paris under that of Cardinal Mazarin. He was twice president of the Academy of St. Luke in Rome. One of the foremost landscape painters of his time, he also executed many etchings and drawings, some of which latter have been mistaken for those of Titian. His works, which are in the manner of the Carracci, include a series of landscapes in the Colonna Gallery, Rome; a series of scenes from the Old Testament in the Quirinal, Rome; several landscapes in the National Library, Paris; two in the Louvre; and a large number of pictures in the Imperial Gallery, Vienna.

GRIMALDI, Joseph (1779–1837). The best-known representative of the clown in English pantomime. His father was an actor of Italian parentage, and "little Joe," who was born in London, Dec. 18, 1779, appeared when scarcely two years old at Sadler's Wells Theatre, where he regularly performed (except for one season) down to the date of his retirement from the stage, prematurely worn out by sheer hard work. For several months each year he used to perform nightly at two different playhouses, and once he achieved the feat of acting at three on the same night. At times he played in regular drama, but as a clown he was considered inimitable. His performance in the pantomime of *Mother Goose* (1806) was many times repeated. At the conclusion of his last appearance, which was as Harlequin Hoax, in his benefit at Drury Lane (1828), he made a pathetic but dignified farewell address. He died in London, May 31, 1837. Consult *Memoirs of Joseph Grimaldi*, edited by Charles Dickens (New York, 1838).

GRIMALKIN, grĭ-măl′kĭn (*gray* + *malkin*, cat). The quasi-personal name of a cat (properly the female). It is also the name of a familiar of one of the witches in *Macbeth*.

GRIMES, grīmz, Bryan (1828–80). A Confederate soldier, born in Pitt Co., N. C. He graduated at the University of North Carolina in 1848 and became a planter in his native county. He was a member of the convention at Raleigh which passed the Ordinance of Secession in 1861. When the Civil War began, he entered the Confederate service as major of the Fourth North Carolina Regiment and served until the surrender at Appomattox. In the battle of Fair Oaks Grimes distinguished himself by his gallantry. He took part in the Maryland campaign in the fall of 1862 and at the battle of Fredericksburg commanded the Fifth Brigade in Gen. D. H. Hill's division of "Stonewall" Jackson's corps. Later he fought at the battles of Chancellorsville and Gettysburg. On June 4, 1864, he was assigned to the command of Daniel's old brigade in Rodes's division of the Second Army Corps. In the fall of 1864 he had command of Rodes's old division and accompanied Gen. Jubal A. Early during the Shenandoah valley campaign. He received his commission as major general in February, 1865, and took an active part in the last struggles of Lee's army. At the close of the war Grimes returned to his plantation in North Carolina. He was shot while driving along a country road near his home in Pitt County.

GRIMES, Frances (1869–). An American sculptor, born at Braceville, Ohio. She graduated from the normal art department of Pratt Institute in 1894. Selected from her class by Herbert Adams to be his assistant, she worked with him until 1901, and then with Augustus Saint-Gaudens. After the death of Saint-Gaudens, in 1907, she finished the caryatids begun by him for the Albright Gallery (Buffalo, N. Y.). Miss Grimes was elected a member of the National Sculpture Society in 1910 and of the Association of Women Painters and Sculptors in 1911, and exhibited frequently at the National Academy of Design, the Pennsylvania Academy of the Fine Arts, and elsewhere. Her work, after 1908, includes a bust of Bishop Potter (Grace Church, New York), two fountains for the Toledo Art Museum, a bust of Winston Churchill, bas-reliefs of Lucretia Mott and Arthur Whiting, and a lunette for the Washington Irving High School, New York.

GRIMES, James Wilson (1816–72). An American politician and legislator, born at Deering, Hillsboro Co., N. H. He graduated at Dartmouth College in 1836 and in the same year removed to Burlington, Michigan Territory, in what is now the State of Iowa. In this year the Iowa country was added to the newly erected Territory of Wisconsin, and Grimes, who had begun the practice of law, was appointed assistant Territorial librarian. He served also as secretary of a commission at Rock Island appointed to negotiate a transfer of lands with the Sac and Fox Indians, and after the organization of Iowa Territory in 1838 served several terms in its Legislature. In 1854 he became the nominee of both the Whig party and Free-Soil Democratic party for Governor of Iowa, and after an exciting campaign was elected. His administration, lasting until 1858, saw the birth of the Republican party in Iowa. He was one of the earliest and most active workers in the formation of that party and after leaving the Governor's chair was elected as a Republican to the United States Senate. He was a member of the Peace Convention of 1861. In 1864 he became chairman of the Committee on Naval Affairs, for the duties of which position he had particularly qualified himself. In 1865 he was reëlected for another term of six years, but served only until 1869, when, after a stroke of paralysis, he resigned. He was one of the few Republican senators who voted for acquittal at the impeachment trial of President Johnson. The last two years of his life were spent in Europe. Consult Salter, *Life of James W. Grimes* (New York, 1876).

GRIMKÉ, grĭm′kȧ, Thomas Smith (1786–1834). An American lawyer and reformer, brother of Angelina and Sarah Grimké. He was born in Charleston, S. C., graduated at Yale in 1807, studied law, and attained eminence at the bar. From 1826 to 1830 he was a member of the State Senate and then and later vigorously opposed South Carolina's nullification projects. He was one of the early advocates of temperance and was an enthusiastic member of the American Peace Society. One of his hobbies was a reform in the spelling of the English language. He published *Addresses on Science, Education, and Literature* (1831).

GRIMKÉ SISTERS, The, Sarah Moore (1792–1873) and Angelina Emily (1805–79). American Abolitionists, and advocates of woman's rights; sisters of Thomas Smith Grimké (q.v.). They were born in Charleston, S. C., where their father, John Faucheraud Grimké, was a prominent lawyer and large slaveholder. After his death, in 1819, the two sisters freed their slaves and removed to Philadelphia—Sarah going first, in 1821, and Angelina following, in 1828. Both joined the Society of Friends and devoted themselves for several years to agitating the antislavery question in that city. In 1836 they removed to New York, where they were intimately associated with the leading spirits of the American Antislavery Society, and during the subsequent winter they attracted considerable attention by delivering public lectures on slavery. At this time Sarah wrote an *Epistle to the Clergy of the Southern States* (1836), which, like Angelina's previously published *Appeal to the Christian Women of the South* (1836), was addressed to their old neighbors. In 1837 they went to Boston, where Sarah lectured on woman's rights, a subject which had begun to interest her in New York, and published in the *New England Spectator* a series of letters on *The Province of Woman.* The next year Angelina married Theodore D. Weld (q.v.), one of the leaders of the Antislavery Society, and, accompanied by Sarah, they went to live at Belleville, N. J., where they remained until 1854, when they established a large coeducational institute at Eagleswood, near Perth Amboy, N. J., which became noted for the independent and enlightened spirit pervading it. Both of the sisters died at Hyde Park, near Boston. Consult Birney, *The Grimké Sisters, Sarah and Angelina Grimké* (Boston, 1885).

GRIMM, grĭm, Friedrich Melchior, Baron von (1723–1807). A noted French journalist and member of the Encyclopædist Circle. He was born in Ratisbon, Germany, of poor parents, and studied at Leipzig. His first production was a tragedy, which was ridiculed at once by the audience and by the critics. Disappointed, he went to Paris as a tutor and remained there as a reader to the Crown Prince of Saxe-Gotha. In 1749 common musical tastes won him the friendship of J. J. Rousseau, and by him he was introduced to the Encyclopædist Circle. Soon afterward he became secretary to Count Friesen, nephew of Marshal Saxe, and so found an entry into the brilliant social circles of Paris, where his intelligence, wit, tact, and good manners soon made him a general favorite. He became wholly French in spirit and was naturalized. His literary reputation was won by a pamphlet, *Le petit prophète de Boehmischbroda* (1753), on the merits of Italian and French opera, a society question of the hour, but his fame dates from the *Correspondance littéraire, philosophique et critique*, begun in 1753 and carried on with various assistants and substitutes until 1759, in the name of Abbé Raynal, who had originated the idea, and then in Grimm's own till 1790. In 1754 Rousseau introduced Grimm to Madame d'Epinay. She soon came to prefer him to the older and intractable lover who left in his *Confessions* a false account of the matter that injured Grimm's reputation for several years. He served as secretary of the Marshal d'Estrées during the Westphalian campaign (1756–57) and was afterward Minister of Saxe-Gotha at the French court. In 1773 he visited St. Petersburg on a diplomatic mission. The Revolution drove him from France, first to Gotha, then to St. Petersburg. There he resided from 1792 to 1795, enjoying the favor of Catharine II (he was for many years her agent for the purchase of art treasures), and thence he was sent as Russian Minister to Hamburg, his last public office. Grimm's *Correspondance* was not published till 1812. It was sent to several sovereigns and to some minor German courts, and made accessible to them, through a sort of secret official organ, the ideas of the French philosophic movement, shrewdly seasoned to the liking of princes, who were induced to see in the new "philosophy" a means of consolidating their power. Thus Grimm was able to contribute very essentially to the spread of the Encyclopædic movement and to prepare the way for introducing the emancipatory ideas of the French Revolution. And besides this the *Correspondance* is a literary review and chronicle—a record of an important literary period of almost unique value. His collaborators, especially Diderot and Madame d'Epinay, carried on the work in his own delicate, subtle, impartial, and profoundly skeptical spirit. The *Correspondance* was first published in 17 octavo volumes (1812–14), better edited by Taschereau (15 vols., 1829–31, with a supplement of *Correspondance inédite*). M. Tourneux collected his works in 16 volumes (1877–82). Grimm's *Mémoires* on his relations with the Empress Catharine have been published by the Russian Historical Society. For a critical literary appreciation, consult: Sainte-Beuve, *Etudes sur Grimm* (Paris, 1854); id., *Causeries du lundi*, vol. vii (ib., 1857–62); Schérer, *Melchoir Grimm* (ib., 1887); K. A. Georges, *Friedrich Melchior Grimm* (Leipzig, 1904); Ad. Julien, *Amours d'Opéra au 18e siècle* (Paris, 1908).

GRIMM, Hermann (1828–1901). A German essayist and critic, a son of Wilhelm Karl Grimm. He was born at Cassel, was educated in Berlin and Bonn, and in 1872 was appointed to the chair of art history at Berlin University. His excellent essays on subjects in art, literature, and history appeared as follows: *Essays* (1859); *Neue Essays* (1865); *Zehn ausgewählten Essays zur Einführung in das Studium der modernen Kunst* (1871); *Fünfzehn Essays, neue Folge* (1875); *Fragmente* (2 vols., 1900–02); *Beiträge zur deutschen Kulturgeschichte* (1897). His principal work is *Das Leben Michelangelos* (2 vols., 1860–63). His biographical-critical lectures on Goethe appeared under the title *Goethe* (2 vols., 1877). His poetical works, *Traum und Erwachen* (1854), *Demetrius* (1854), a tragedy; his fiction, *Ueberwendliche Mächte* (3 vols., 1867), a novel; and his *Novellen* (1856) are not strong.

GRIMM, Jakob Ludwig Karl (1785–1863). An eminent German philologist and antiquary, born Jan. 4, 1785, at Hanau in Hesse-Cassel. He was educated in philology and law at Marburg (1802), and afterward (1805) visited Paris, where he pursued a variety of studies under the direction of Savigny and cultivated his taste for mediæval literature. On his return to Germany at the close of the year, he was employed in the office of the Minister of War at Cassel and became successively librarian to the King of Westphalia (Jerome Bonaparte), and auditor to his Council of State (1808). In 1814 he was secretary to the Ambassador of the Elector of Hesse at Paris, and later on in the same year attended in a similar capacity the Congress of Vienna. While in Paris he claimed, by order of the Prussian government, the restoration of valuable manuscripts and books which had been removed to Paris by the armies of Napoleon I. In 1829 he, jointly with his brother Wilhelm, received the appointment of professor of German literature and librarian of the University of Göttingen. The brothers were among the seven professors who protested in 1837 against the abolition of the constitution by the King of Hanover, for which act they were banished and obliged to retire to Cassel. In 1840 both were invited to Berlin by the King of Prussia, where as members of the Academy they were entitled to give lectures. Jakob was in 1848 elected member of the Frankfort Parliament. He was, however, with all his interest in political affairs, averse to party strife, and his life was devoted to philological and antiquarian studies. His German *Grammar*, in four volumes, the first volume of which was published in 1819, and the last in 1837 (4th ed., 1870–98), is one of the greatest philological works of the age and may be said to have laid the foundation of the historical investigation of language. His *Deutsche Rechtsaltertümer* (1828; 4th ed., by Heusler and Hübner, 1899) and *Deutsche Mythologie* (1835) are exhaustive works upon the society of the Middle Ages in central Europe and the religious traditions and superstitions from the earliest times. His *Geschichte der deutschen Sprache* (1848; 4th ed., 1880) and *Ueber den Ursprung der Sprache* (1851) are also works of great importance. In company with his brother Wilhelm he published numerous works of a more popular character, the best known of which is *Kinder- und Hausmärchen* (1812–15; 5th ed., 1843; 47th ed., 1906). The greatest joint undertaking of the two brothers (now carried on by other scholars) is the *Deutsches Wörterbuch*, begun in 1852, of which the latest volume to appear is the fifteenth (1913). *Gammer Grethel's Fairy Tales* was published in 1862. His essays and other articles have been gathered together in the collection entitled *Kleinere Schriften* (8 vols., Berlin and Gütersloh, 1864–90). In vol. i of this series may be found the well-known *Selbstbiographie*, in which his life may be best studied. The following collections of the letters of Jakob and Wilhelm may be noted: *Briefwechsel aus der Jugendzeit*, ed. by H. Grimm and Hinrichs (Weimar, 1881); *Briefwechsel mit nordischen Gelehrten*, ed. by Schmidt (Berlin, 1885); *Briefwechsel*, ed. by Ippel (ib., 1885–86); *Briefe an G. F. Benecke, 1808–29*, ed. by Müller (Göttingen, 1889); *Acht Briefe*, ed. by Clausen in *Euphorion* (Vienna, 1907). Consult: Duncker, *Die Brüder Grimm* (Kassel, 1884); Francke, *Die Brüder Grimm: ihr Leben und Wirken in gemeinfasslicher Weise dargestellt* (Dresden, 1899); Scherer, *Jakob Grimm* (Berlin, 1885); Tonnelat, *Les frères Grimm, leur œuvre de jeunesse* (Paris, 1912); *Les contes des frères Grimm, étude sur la composition et le style du recueil des Kinder- und Hausmärchen* (ib., 1912).

GRIMM, Wilhelm Karl (1786–1859). A German philologist, brother of Jakob Grimm. He was born at Hanau, Feb. 24, 1786. He was the companion of his elder brother at the Lyceum of Cassel and the University of Marburg. In 1814 he was secretary of the librarian of Cassel, and on removing to Göttingen in 1830 was appointed assistant librarian under his brother, and in 1831 professor extraordinary in the philosophical faculty. He joined his brother in the protest against the King of Hanover, shared his exile, and also his call to Berlin. They labored together on the *Wörterbuch*, the *Märchen*, and many other works, and were commonly known as the Brothers Grimm. Wilhelm died Dec. 16, 1859. Among his works may be mentioned: *Altdänische Heldenlieder* (1811–13), a translation; *Altdeutsche Gespräche* (Berlin, 1851); *Die deutsche Heldensage* (1829; 3d ed., 1889); *Friedank* (1834; 2d ed., 1860); *Ruolandslied* (1838); *Athis und Prophilias* (1846). His *Kleinere Schriften*, a complete collection of essays, were published by Hinrichs (4 vols., 1881–87). See Grimm, J. L. K., and consult the authorities there referred to. Consult also Steig, *Goethe und die Brüder Grimm* (Berlin, 1892).

GRIMMA, grĭm′mȧ. A town of Saxony, Germany, situated in a hollow on the left bank of the Mulde, 19 miles southeast of Leipzig (Map: Germany, E 3). The vicinity is very picturesque, and the town is well laid out and attractive. It has a Catholic church of the thirteenth century, an old castle now used for public offices, and a fifteenth-century town hall. The Fürstenschule, consecrated in 1550 and occupying since 1892 a new building, the teachers' seminary, the trade school, and the brewers' school are the chief educational institutions. In the vicinity of the town are found the ruins of the thirteenth-century convent of Nimbschen, to which Katharina von Bora, Luther's wife, once belonged. Grimma was once noted for its textiles. It is in the midst of a busy industrial district which makes machinery, leather, gloves, vehicles, umbrellas, trunks, and paper; it has large bleacheries, dye works, flour mills, and nurseries. Pop., 1900, 10,892; 1910, 11,440. Grimma is first mentioned as a town in 1065.

GRIMME, grĭm′e, Hubert (1864–). A German Orientalist, born in Paderborn and educated at the University of Berlin. In 1889 he became professor in the new University of Fribourg and in 1891 professor of Semitic languages at Münster. His published works include the important biographical studies of *Mohammed* (2 vols., 1892–95, 1904) from original sources; *Psalmenprobleme* (1902); *Das israelitische Pfingstfest und der Pleiadenkult* (1907); *Die Oden Salomos* (1911).

GRIMMELSHAUSEN, grĭm′mels-hou′zen, Hans Jakob Christoffel von (c.1625–76). A German novelist. Little is definitely known of his life. He was apparently a peasant's son, born in Gelnhausen. His important *Simplicissimus* is the only German fiction of the seventeenth century that can still be read with pleasure. He served as a soldier through the later period of the Thirty Years' War, when, able to observe the traits of the common people, he thus collected ample material for his future studies in fiction. From Protestantism he turned late in his life to Catholicism and served for a time the Bishop of Strassburg. For a while, too, he was a magistrate at Renchen in Baden, where he died. *Der abenteuerliche Simplicissimus* (1668) is, as its subtitle states, "The Description of the Life of a Strange Vagabond Named Melchior Sternfels von Fuchshaim, etc." It is a direct imitation of the Spanish picaresque novels, as well as a wonderfully realistic narrative drawn from the author's own experiences. No contemporary writing gives a more vividly realistic picture of the desolation wrought in Germany from 1618 to 1648. Among his other productions may be named the picaresque tales: *Trutz Simplex oder Lebensbeschreibung der Erzbetrügerin und Landstörtzerin Courasche* (c.1669), *Der seltsame Springinsfeld* (1670), and *Das wunderbarliche Vogelnest* (1672); the satirical *Schwarz und weiss oder der satyrische Pilgram* (1666); *Der teutsche Michel* (1673); and the more ambitious *Des vortrefflich keuschen Josephs in Aegypten erbauliche Lebensbeschreibung* (1670) and *Dietwalds und Ameliaden anmutige Liebs- und Leidsbeschreibung* (1670). There are good modern editions of *Simplicissimus* by Keller (Stuttgart, 1852–62) and Tittmann (Leipzig, 1877), and a reprint edited by Kögel (Halle, 1880). Consult Erich Schmidt, *Charakteristiken* (Berlin, 1886), and F. Hoffmann, *Erläuterungen zu Grimmelshausens Simplicissimus* (Leipzig, 1908).

GRIMM'S LAW. A phonetic law stating the changes, commonly termed the first and second sound shiftings, undergone by the mutes or explosives of the Indo-Germanic consonant system in the Low and High Germanic languages respectively. The law, which is one of the most important of all phonetic laws (see Phonetic Law), was first developed by Jakob Grimm (q.v.), who outlined it in a letter to Lachmann, Nov. 25, 1820, and in the second edition of his *Deutsche Grammatik* (1822), although the Danish scholar Rask (q.v.) had enunciated its main phenomena in 1819. The law is of much importance in the history of philology (q.v.) as having furnished one of the basal arguments in favor of the theory of the invariability of phonetic law. The fact that there are many words which seem to violate Grimm's law, but which are explained by Verner's law (q.v.) and Grassmann's law (q.v.), is a confirmation of this theory, for it is evident that many linguistic phenomena which are still obscure are probably due to the action of laws which have not yet been discovered. The law of Grimm concerns the mutes, comprising the tenues, mediæ, and mediæ aspiratæ (the tenues aspiratæ being rare and in many cases extremely doubtful) of the Indo-Germanic palatal, velar, and labialized velar series (all combined into palatals in Germanic), $\hat{k}$, $\hat{g}$, $\hat{g}h$, q, g, gh, q^{u}, $g^{\underset{\frown}{u}}$, $g^{\underset{\frown}{u}}h$; dentals, *t*, *d*, *dh*: and labials, *p*, *b*, *bh*. The law in its most general terms may be stated as follows: Indo-Germanic tenues become the corresponding aspiratæ in Low Germanic and remain unchanged in High Germanic; Indo-Germanic mediæ become the corresponding tenues in Low Germanic and affricatæ in High Germanic; Indo-Germanic mediæ aspiratæ become mediæ in Low Germanic and tenues in High Germanic. Representing, for convenience, the Indo-Germanic palatals, velars, and labialized velars as simple palatals, the following table may be constructed to make the definition clear:

	IG.	*LG.*	*HG.*
Tenues................	*k* *t* *p*	*h* *th* *f*	*h* *th*(*d*) *f*
Mediæ................	*g* *d* *b*	*k* *t* *p*	*ch*(*k*) *z* *pf*
Mediæ aspiratæ.........	*gh* *dh* *bh*	*g* *d* *b*	*k*(*g*) *t* *p*(*b*)

It is evident from the table that the changes are more uniform in Low Germanic than in High Germanic. The various Old High German dialects stand in this respect in different stages of development, as is described in GERMAN LANGUAGE. The dialect which has carried out the High Germanic change most thoroughly is the Alemannic, e.g., *thrī*, Ger. *drei*, three; *chneo*, *Ger. Knie*, knee; *kot*, Ger. *Gott*, God; *pruader*, Ger. *Bruder*, brother. As examples of Grimm's law, citations may be made of Indo-Germanic words present in Sanskrit, Greek, Latin, Gothic, English, Old High German, and New High German.

There are certain exceptions in addition to those already indicated in the table. Thus, after *s*, the tenues remain unchanged (cf. *sty* and its cognates given below; the Indo-Germanic combination *pt* becomes Germanic *ft*, and *kt*, *qt*, $q^{\underset{\frown}{u}}t$ become *ht* (Gk. *κλέπτης*, thief, Goth. *hliftus*; Skt. *nakti*, night, Goth. *nahts*), while $q^{\underset{\frown}{u}}$ and $g^{\underset{\frown}{u}}h$ have a more complex development than can be outlined here.

	Skt.	Gk.	Lat.	Goth.	Eng.	OHG.	Ger.
k	*kampatē*	*κώπη*	*capere*	*hafjan*	*heave*	*heffan*	*heben*
t	*trayas*	*τρεῖς*	*tres*	*þreis*	*three*	*drī*	*drei*
p	*pad*	*ποῦς*	*pes*	*fōtus*	*foot*	*fuoz*	*Fuss*
g	*jānu*	*γόνυ*	*genu*	*kniu*	*knee*	*kniu*	*Knie*
d	*damayati*	*δαμᾶν*	*domare*	*ga-tamjan*	*tame*	*zamjan*	*zähmen*
b	....	....	*tribus*	*þaúrp*	*thorp*	*dorf*	*Dorf*
gh	*stighnōti*	*στείχειν*	......	*steigan*	*sty*	*stīgan*	*steigen*
dh	*rudhira*	*ἐρυθρός*	*ruber*	*rauds*	*red*	*rōt*	*rot*
bh	*bhrātar*	*φράτηρ*	*frater*	*brōþar*	*brother*	*bruoder*	*Bruder*

The cause of both sound shiftings has been explained as an increase in the speed of utterance, but this theory is open to many objections. The change seems to be due in reality to an increased force of expiration of the vocal current. Thus, it is evident experimentally that an increased stress on a media or sonant will produce a tenuis or surd, as in the emphatic pronunciation of such a word as "Gad!" and in like manner emphatic aspiration, as in the change of *t* to *th*, is a recognized phonetic phenomenon. It is noteworthy that changes to some extent analogous to the operation of Grimm's law are found in other languages. Thus, in the Bantu group of South Africa a similar change may be observed, and among the Indo-Germanic dialects the Armenian language (q.v.) is conspicuous for its change of the old tenues to mediæ, and of the old mediæ to tenues (e.g., Old Armenian *p*, *d*, *g* = New Armenian *b*, *t*, *k*).

Chronologically the first sound shifting seems to have been carried out between 500 and 250 B.C. It began with the change of the tenues to tenues aspiratæ, which then became, as in Greek, voiceless spirants (e.g., *t* became *th*, then *þ*). The second change was that of the Indo-Germanic mediæ aspiratæ to voiced spirants and then to mediæ (e.g., *dh* became *δ*, then *d*). This was accomplished less uniformly than the first change, so that *g* long retained its spirant value. Verner's law (q.v.) seems to have come into operation at this period. The third change was that of the Indo-Germanic mediæ to tenues. The second or High Germanic sound shifting apparently took place between the fifth and seventh centuries. The earliest was that of the voiceless *þ* to the voiced *δ*, whence came *d*. This began in the Oberdeutsch dialects Alemannic and Bavarian, spread to the Middle Frankish, and finally included the Niederdeutsch group of Lower Frankish and Saxon. The other changes of the second sound shifting followed, with the limitations already noted, the same geographical course. See GERMAN LANGUAGE; PHONETIC LAW; PHONETICS; VERNER'S LAW.

GRIMS'BY. A village in Lincoln Co., Ontario, Canada, on Lake Ontario, and on the Grand Trunk Railway, 18 miles east of Hamilton and 18 miles west of St. Catherines (Map: Ontario, E 7). Its industrial establishments include canneries, planing mills, and manufactories of electric fittings and stoves. The village owns its water works. It is situated in a fruit-growing region which is famous for its peaches, grapes, and apples. Pop., 1901, 1001; 1911, 1669.

GRIMS'BY, GREAT. A seaport and market town in Lincolnshire, England, on the Humber, 20 miles east-southeast of Hull (Map: England, F 3). The town consists of two portions—the older with irregular streets, and the new, to the east, spacious and regularly laid out. The chief buildings are the fine old parish church, the town hall, customhouse, corn exchange, free grammar school, mechanics' institute, and the dock warehouses. The town provides a school for technical instruction, owns the market and much remunerative leasehold and real estate. It has an electric-lighting and power plant. It is chiefly famous for its immense fishing trade, having a fleet of over 500 steam trawlers, but has shipbuilding works, breweries, tanneries, flax-dressing and bone-crushing mills, and manure works. Its harbors and docks cover 350 acres.

The Great Central Railway (formerly the Manchester, Sheffield, and Lincolnshire) has played an important part in the development of the town. Many of the docks have been built by this corporation, its latest enterprise being the great docks of Immingham, on the Humber, 5 miles above the town. It exports the manufactures of west Yorkshire and Lancashire. It imports the raw and manufactured products of Russia, Denmark, Norway, and Germany. Grimsby takes its name from Grim, a fisherman of Arthurian legend. It has numerous tumuli and Roman remains and is the traditional spot where the Danes first invaded England. It received its charter of incorporation from King John and further charters from Edward I and Edward III. It sent 11 ships to assist Edward III in his expedition against Calais (1346). The silting of the harbor led to its decline, but prosperity revived with the harbor improvements of 1849–58. Pop., 1901, 63,138; 1911, 74,663. Consult Shaw, *Old Grimsby* (Grimsby, 1897).

GRIMSEL (grĭmzel) **PASS.** A pass, a little over 7000 feet high, of the Bernese Alps, Switzerland (see ALPS), leading from Italy and south Switzerland into the Hasli Thal or Upper Valley of the Aar, and forming the boundary between the cantons of Bern and Valais. The victory of the French, whose advance from the Hasli Thal in 1799 was opposed by the Austrians, is commemorated by the Todtensee (Lake of the Dead).

GRIM′STON, W. H. See KENDAL, MR.; KENDAL, MRS.

GRIN′DAL, EDMUND (c.1519–83). An English prelate, born near St. Bees, Cumberland. He graduated at Cambridge in 1538, became private chaplain to Bishop Nicholas Ridley, and in 1541 chaplain to Edward VI, after whose death he went to the Continent and remained till 1559. He succeeded Bonner in 1559 as Bishop of London. His leniency towards the Puritans did not further the establishment of the Anglican system, and he was transferred to the see of York in 1570. On the death of Archbishop Parker Queen Elizabeth favored his accession to the see of Canterbury, to which he was elected in 1575. The Queen had counted on his tractability, but was disappointed to find him rigidly conscientious in his refusal to suppress Puritan activities. He was sequestered in 1577 and was not fully restored for five years. His life was edited by Strype (London, 1710). His writings, and a life by the Rev. William Nicholson, were published by the Parker Society in 1853.

GRINDE′LIA. A genus of plants of the family Compositæ, named in honor of David Hieronymus Grindel, a Russian botanist. There are about 50 species, which are found from the United States through Mexico into South America. The plants are rather coarse, biennial or perennial, with numerous many-flowered heads of yellowish flowers. Often the plants are viscid from a resinous exudation, on which account they are commonly called gumweeds or tarweeds. Two species have come into some repute in medicine, *Grindelia squarrosa* and *Grindelia robusta.* The first is found in dry soils from Illinois and Minnesota, southward and westward. It has rayless flower heads with a scaly involucre. The other abounds in California and is a more vigorous-growing plant. The plants contain volatile oil, resin, grindeline, etc., and have expectorant, antispasmodic, sedative, tonic, and diuretic properties. The fluid extract is used also as an external application for burns, etc., and it has some reputation as a cure for *Rhus*, or poison ivy, poisoning.

GRINDELWALD, grĭn′del-vält. One of the most beautiful valleys of the Bernese Alps, situated in the eastern part of the Canton of Bern, 3402 feet above sea level (Map: Switzerland, C 2). It is celebrated for its glaciers, the Lower Grindelwald descending lower than any other of the Alpine glaciers. Grindelwald is a favorite resort for tourists both in winter and summer. Pop., 1900, 3370; 1910, 3468.

GRIND′ER (from *grind*, AS. *grindan;* ultimately connected with Lat. *frendere,* to gnash). A small Australian flycatcher (*Seisura inquieta*), which, besides its ordinary whistle, produces a sound resembling that made by a scissors-grinder's machine. This sound is made while the bird hovers in the air (its whole manner of flight is remarkable), but how it is produced is not known.

GRIND′ING. The operation of shaping or smoothing any hard substance by rubbing away its surface with a rough stone or with a cutting powder. It is similar to filing and is used in cases where, from the hardness of the material or for other reasons, filing is inapplicable. Thus cutting tools and other steel instruments may be filed before hardening and tempering; but after this, if further abrasion is required, they must be ground. Glass lenses and metal specula are ground into shape with emery powder laid upon a metal tool. Ornamental glass is ground into facets or otherwise by means of stones and lap wheels. Diamonds and other gems are ground or cut with diamond dust embedded in soft iron. When large flat surfaces are required, they are obtained by first working two pieces of the substance nearly flat and then laying one upon the other and grinding their surfaces together with sand, emery, or other suitable cutting powder. Plate glass is finished in this manner; also surfaces of cast iron where accurate fitting is required, the iron surface being either prepared with a planing machine or by turning in a lathe. Sockets and other bearings which require to be fitted with great accuracy are usually finished by grinding together. For brass and bell metal powdered pumice stone is best adapted for such purposes, as emery is liable to embed itself in the metal and give it a permanent cutting action upon the bearings. *Dry grinding* is the term applied to the grinding of steel with dry grindstones. Its principal applications are in the grinding of the points of needles and forks, the surfaces of gun barrels, and in finishing steel pens. See GRINDING, CRUSHING, AND PULVERIZING MACHINERY; CUTLERY.

GRINDING, CRUSHING, AND PULVERIZING MACHINERY. For the reduction of the size of rock, ores, and other substances, various machines are used, depending upon the size and character of original material and the fineness of the product desired. Naturally there are a large number of these machines in use, but the more important types conveniently can be grouped together. Thus, for reducing the size of rock to about 1 inch *breakers* are used, for reducing the size from 1 inch to about 20 mesh, i.e., so that the fragments will pass a screen with 20 meshes to the inch, *crushers* are used, and for the further reduction to an impalpable powder, *pulverizers* are used. It must be borne in mind that the word "crushing" is often incorrectly used for breaking. Crushing and pulverizing are often accomplished in one machine, such as the stamp mill; the machine is then known as a pulverizer.

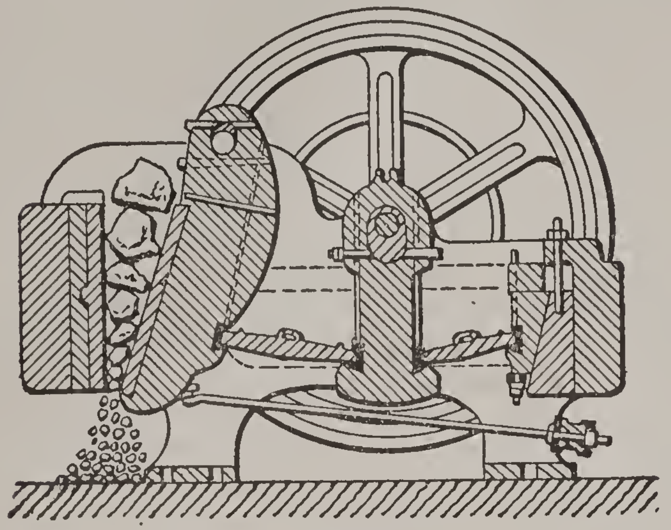


Fig. 1. VERTICAL SECTION OF BLAKE JAW BREAKER.

Breakers. *Jaw Breakers.*—The common practice preceding the invention of jaw breakers was to break rock and ore with a specially designed hammer, known as the *spalling hammer.* In 1858 Eli Whitney Blake, one of the commissioners of roads for the city of New Haven, Conn., designed and patented the Blake jaw breaker for breaking stone for macadamizing Whalley Avenue in that city. This machine consisted of two jaws, one fixed and one movable, so arranged as to form a V-shaped opening between them. In the original design the movable jaw was supported by a cross pin at the bottom. This was quickly improved upon by Mr. Blake by suspending the movable jaw by a cross pin at the top and transmitting a reciprocating motion to the lower portion of the jaw by means of two toggles and a pitman operating on an eccentric. The jaw breaker in common use to-day is of the Blake pattern, with only slight mechanical changes, but no change from the original principle. The size product may be regulated by raising or lowering the adjusting wedge at the rear or by inserting longer or shorter toggles. As the eccentric raises the pitman, the toggles approach the horizontal, thereby moving the movable jaw forward to crush the rock; as the pitman is lowered, the movable jaw is drawn back by its weight and the toggle spring, opening the jaws for the discharge of the broken rock. Only about 40 per cent of the total time is consumed in the forward motion when actual breaking takes place. This led to the invention of the gyratory breaker, a machine which while breaking on one side is discharging on the side diametrically opposite.

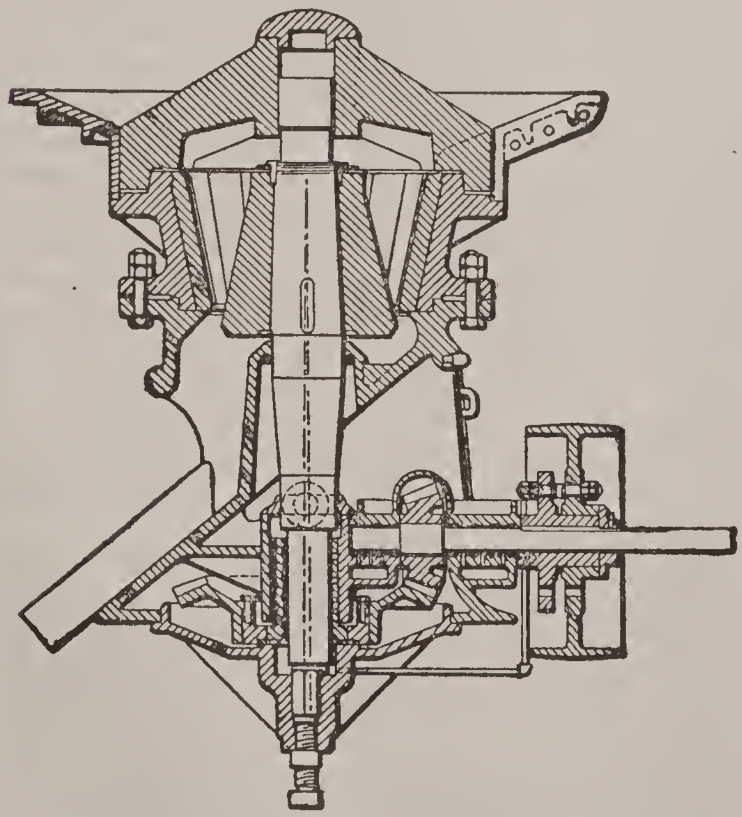


Fig. 2. VERTICAL SECTION OF GYRATORY BREAKER FOR STONE AND ORES.

Gyratory Breaker.—This machine consists of an annular V-shaped opening to receive the rock or ore similar to the jaw breaker; instead of the movable jaw or head having a reciprocating motion, it has a gyratory motion imparted to it from a vertical shaft or spindle resting in an eccentric at the base; this eccentric cup is revolved by gears connected with a belt-driven pulley. The vertical shaft or spindle to which is attached the crushing head may be either suspended from a spider at the top or supported on a steel step in the eccentric. The gyratory head and the stationary concaves between which the rock is broken are replaceable when worn. To prevent rupture of the machine in case a piece of steel is accidentally fed with the ore, a breaking pin is used to attach the belt-driven pulley to the shaft. The ore is broken between the head and concaves as the head approaches the concaves, and the broken ore is discharged diametrically opposite at the same time. These machines are very heavy and have large capacity as compared with a jaw breaker. They are applicable when large quantities of rock are broken daily over a considerable period of time.

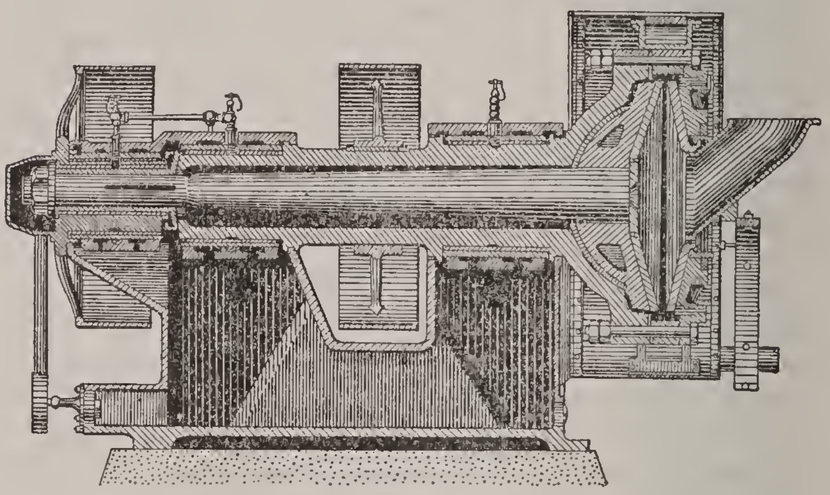


Fig. 3. SYMONS DISK BREAKER AND CRUSHER (VERTICAL SECTION).

Symons Disk Breakers and Crushers.—These machines are of recent invention, and several large mining companies installed them during 1913 after their efficiency had been tested in an experimental plant. The machine consists of two vertical disks of manganese steel set with their hollow or concave sides facing each other. The disks are supported at an angle to each other, thereby providing a wider opening between the edges of the disks at one part of their circumference. Both disks are rotated in the same direction and at the same speed. The outside disk is supported and revolved by a hollow shaft through which passes an inner solid shaft supporting at one end the inner disk; the other end of the solid shaft rests in an eccentric in the centre of a revolving pulley. To the hollow shaft is keyed a pulley resulting in a positive speed being transmitted to the outer disk. The inner disk receives a gyrating motion from the eccentric and is made to revolve by the friction of the ore fed between the disks. The inner disk has a gyrating or oscillating motion similar to the crushing head of a gyratory breaker. The ore is fed through the centre of the outer disk and thrown by centrifugal force to where the disks are widest apart; as the disks come closer together, the ore is crushed and the smaller particles discharged or thrown out by centrifugal force.

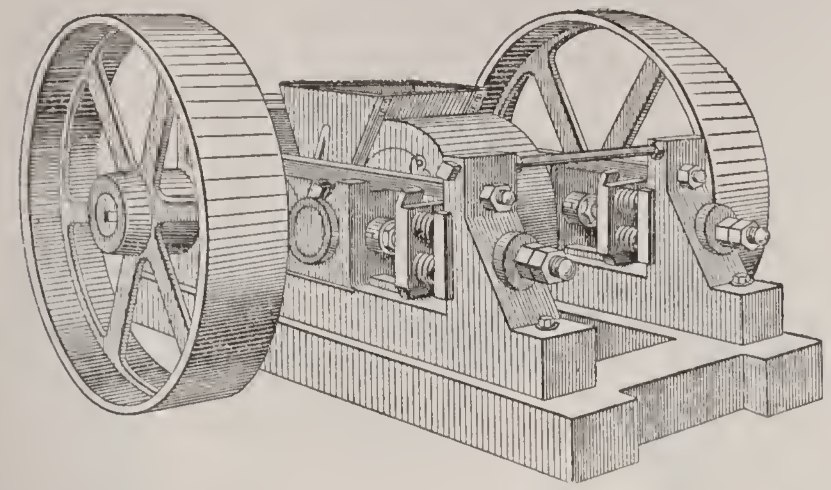


FIG. 4. CRUSHING ROLLS.

Crushers. *Rolls.*—For crushing of ores preliminary to coarse concentration, rolls are generally used. The feed varies in size from 2 inches to about $\frac{1}{4}$ of an inch and the product from 1 inch to about $\frac{1}{10}$ of an inch. There are many types, varying in mechanical details, but the principle on which the ore is crushed is the same with all types. The ore is fed between two revolving steel cylinders and broken by compression. The machine consists of two heavy shafts supported in boxes or bearings. The bearings of one shaft are usually held rigidly in place, and the bearings of the second shaft are movable, for adjustment, and held up to place by heavy car springs; fastened to the shaft is a hub upon which is fastened the crushing surface or shells. The crushing shells vary from 2 to 5 inches in thickness and are easily replaceable when worn.

Pulverizers. *Stamp Mills.*—Probably the earliest form of machine for pulverizing ores was the gravity stamp. Many improvements have been made in its construction so as to increase its efficiency; the capacity has been greatly increased by increasing the weight of the falling stamp and introducing a solid concrete foundation capped with iron. Only a few years ago stamps weighing from 900 to 1000 pounds were considered heavy, whereas in 1914 stamps on the Rand weighing 2000 pounds were being dropped and in the United States the weight in some of the larger mills had reached about 1400 pounds. The capacity of stamps varies greatly with the character of the ore and size of discharge screen; in the United States the capacity varies from 3 to 10 tons, and in South Africa the capacity reaches 20 tons per stamp. The principle upon which gravity stamps operate is the lifting of the stamp by a cam attached to a cam shaft and allowing it to fall by gravity. The stamp proper consists of a shoe attached to a stem by means of a boss or stamp head; at the upper end of the stamp stem is attached the tappet by means of which the stamp is raised by the cam. The mortar box into which the stamp drops contains shoes upon which the ore is fed by hand, or an automatic feeder operated by mechanism attached to one of the stamps. Water is fed into the mortar box with the ore, and as the stamp drops upon the wet ore the pulverized ore is splashed through a discharge screen which forms the front of the mortar. As the dies wear, the height of the screen is lowered. Gravity stamps are largely used in gold milling and generally constructed with five stamps to one mortar; this is known as a battery.

Steam stamps are used for crushing the native copper ores of the Lake Superior district and have been developed so as to have enormous capacity as compared with gravity stamps, but the Lake Superior steam stamp has not been successful on gold ores. The Holeman steam stamp, having a capacity about the same as the gravity stamp, has been successfully operated on gold ores in Australia. Small steam stamps, such as the Holeman and Tremain, are sometimes used in connection with the testing of ores from a gold mine preliminary to the installation of a large number of gravity stamps.

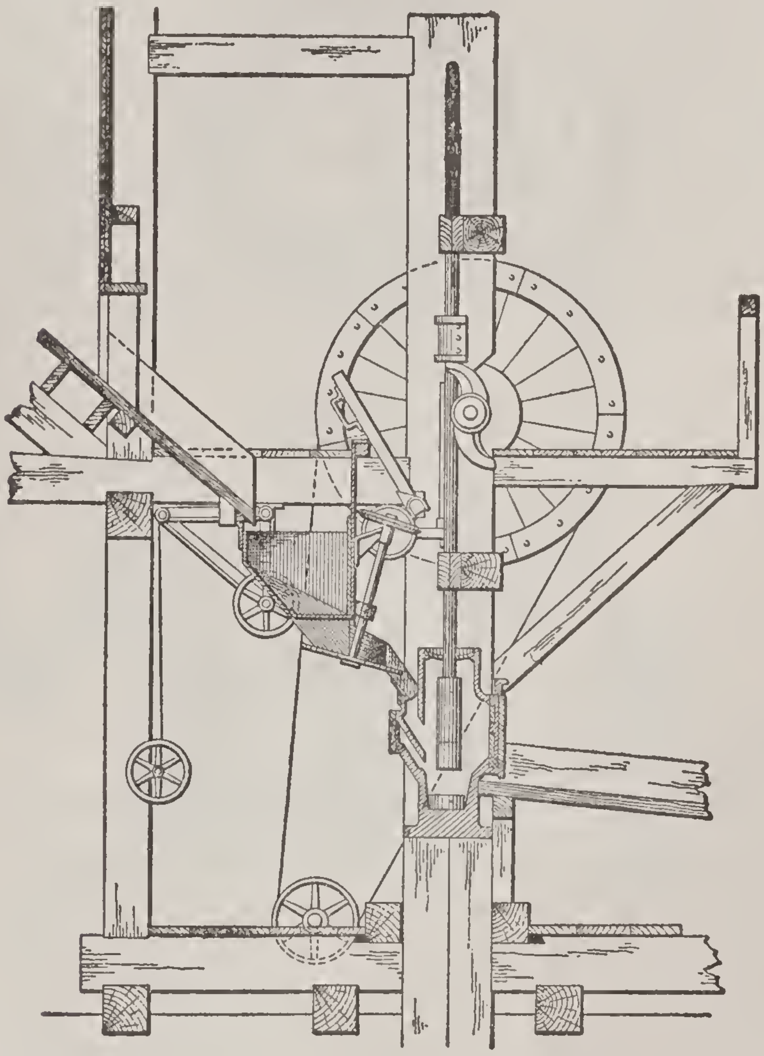


FIG. 5. VERTICAL SECTION OF GRAVITY-STAMP MILL FOR CRUSHING GOLD ORE.

Ball Mills.—Before the invention of the tube mill, ball mills were very popular where it was necessary to pulverize ores dry to a required fineness. The mill consists of a revolving cylinder supported by suitable shafting. The interior of the mill contains perforated, spiral-chilled iron plates known as die rings and so arranged that each laps the one following, thereby forming a series of steps. A narrow opening is left between the plates to permit the return of crushed material not fine enough to be discharged through the outside screen. Outside of the die-ring plates are coarse perforated screens to take the wear, and outside of these coarse screens is the fine gauze screen which regulates the size of discharged material. The pulverizing is done by the attrition of steel balls which are added to the mill from time to time as necessary. There are various makes of these machines, such as the Krupt, Buckner, Gruson, and Janisch.

Tube Mills.—Various metallurgical processes developed within the past few years require that the size of the tube mill of the ore be reduced below 100 mesh. The rapid development has solved this problem, and to-day it is the standard machine for pulverizing below 100 mesh. It consists of a steel cylinder with heavy cast-iron ends, supported on hollow axial trunnions on which it revolves. The cylinder itself is provided with a suitable lining and is charged with a quantity of flint pebbles or broken quartz rock from the mine. The material to be pulverized, mostly finer than 10 mesh, is charged through one of the hollow trunnions, together with water, mixes with the pebbles and, by the rubbing and pounding action of the pebbles as the cylinder is revolved, is reduced to a fine state of subdivision. The ground pulp is discharged from the cylinder at the opposite end from where the feed enters. The mills as originally designed were approximately 22 feet long by 4 or 5 feet in diameter. These dimensions have gradually changed, and in 1914 the most efficient type appeared to be approximately 14 feet long by 5 or 6 feet in diameter. One plant installed about this time a mill 10 feet long and 8 feet in diameter, from which most satisfactory reports were forthcoming. The tendency is to shorten the cylinder and increase the diameter. Many improvements have been made in methods of feeding and discharging. Recently a new discharge has been designed by Chalmers and Williams, resulting in a greatly increased capacity and a granular product suitable for concentration.

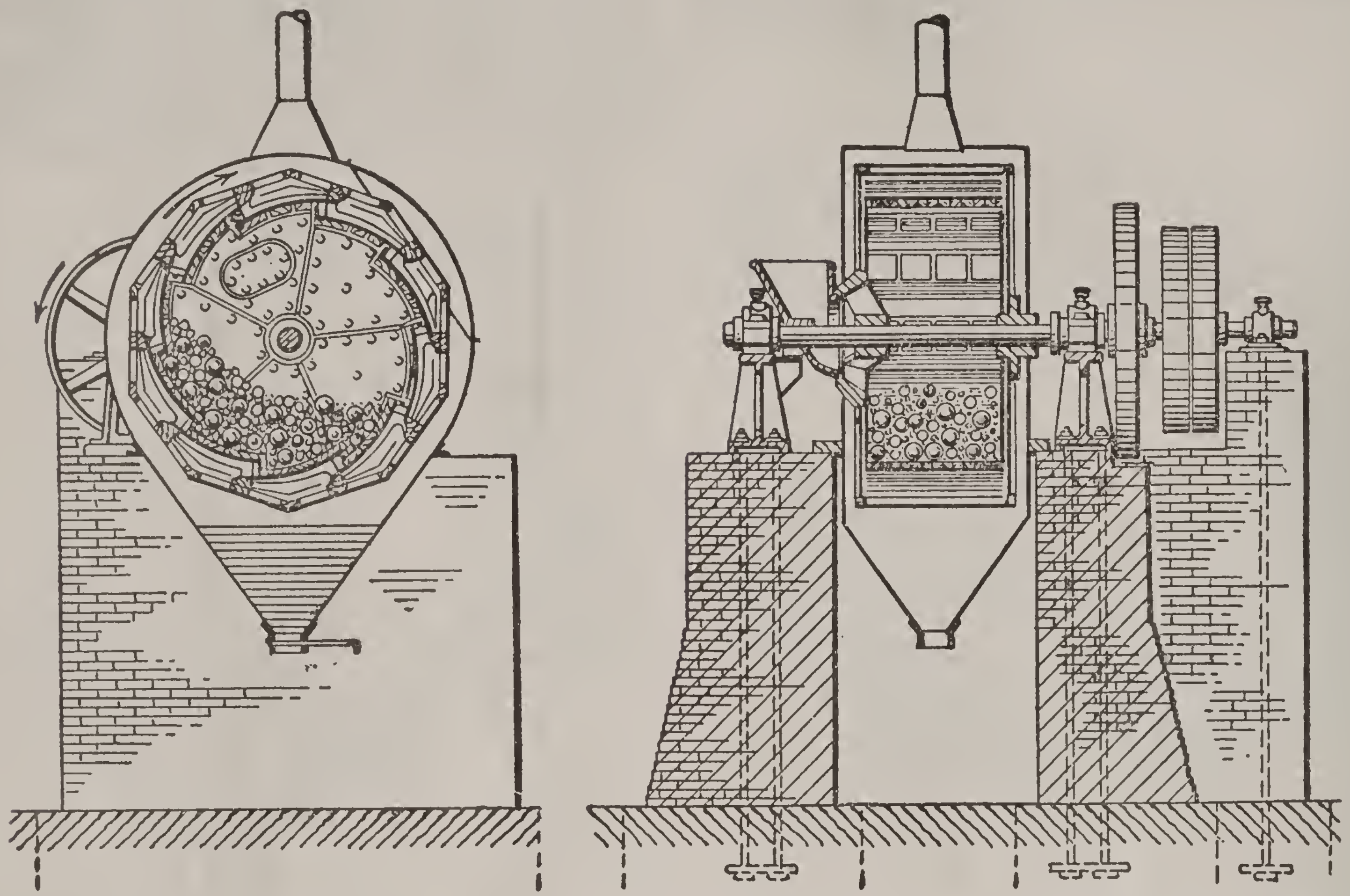


Fig. 6. TRANSVERSE AND LONGITUDINAL SECTIONS OF BALL MILL FOR FINE GRINDING.

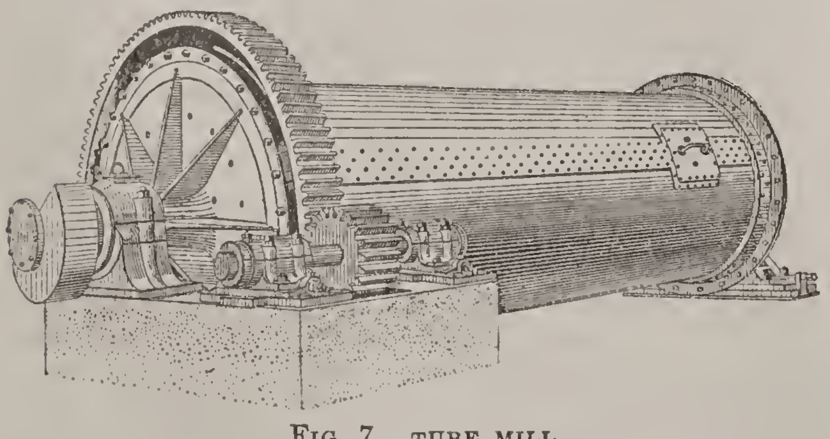


Fig. 7. TUBE MILL.

Hardinge Conical Mill.—This mill is a modification of the tube mill. It is of recent invention and has found wide application in pulverizing ores where a granular product is desired for concentration. It consists of a short steel cylinder, approximately 10 to 30 inches long and 5 to 8 feet in diameter. The feed end of the cylinder is covered with a heavy, slightly coned cast-iron plate with a hollow axial trunnion for support. Opposite the feed end the cylinder has attached to it a discharge cone having an angle of about 45°. This discharge cone ends in a hollow trunnion for support. The mill is revolved with a charge of pebbles similar to the tube mill. The ore is continually fed and discharged through the axial hollow trunnions. The effect of the conical discharge is to force the larger pebbles to that portion of the mill having the greater diameter, resulting in a much heavier grinding action on the coarser particles of the feed and less slimes in the discharged pulp.

Edge Runners, or *Chile Mills.*—Originally designed as a comparatively coarse crushing machine to prepare ores for the arrastra or pulverizer, this machine later was used as a pulverizer, but since the invention of the tube mill it has largely been replaced for this work. In a few mills it is still used as a pulverizer. It consists of two or three heavy vertical rollers revolving in a stationary pan on a horizontal axis and gyrating around a central vertical axis. The pan contains a die ring upon which the rollers gyrate, and screens in the side of the pan through which the ore is discharged. The mills are subdivided into two classes, known as slow-speed and high-speed mills. The rollers used in slow-speed mills are much wider than those used in high-speed mills. These mills are also made when the rollers revolve around a stationary axis, and the pan containing the die ring is made to revolve.

Huntington Mill.—A pulverizer largely used only a few years ago, but recently replaced by other types of machines. It consists of horizontal rollers differing in this respect from the edge runners, suspended in a pan from a vertical shaft; the vertical shaft is suspended from a horizontal spider, which in turn is connected to a central revolving shaft. The rollers revolve against a die ring in the pan and gyrate around the central vertical shaft. The ore is pulverized between the rollers, which are thrown out by centrifugal force, and the die ring, and discharged through a screen inserted in the side of the pan.

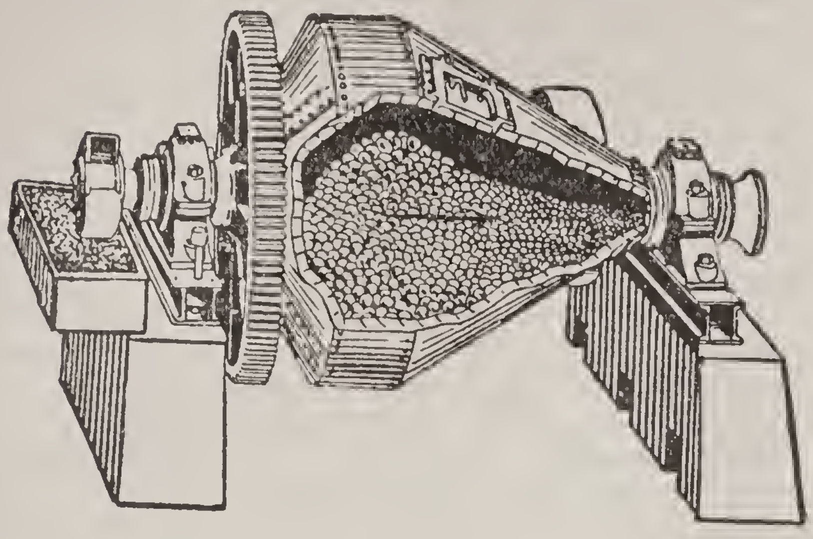


Fig. 8. HARDINGE BALL MILL.

Grinding Pans.—Before the invention of the tube mill and the development of the cyanide process grinding pans were largely used in gold and silver mills for pulverizing and amalgamating. They are still used in Western Australia, but have been almost entirely replaced in America and South Africa by the tube mill. The advantage which the grinding pan has over the tube mill is the possibility of amalgamating during the grinding. It consists of a flat-bottomed pan with a cone in the centre and high vertical sides. In this pan a horizontal muller or circular disk is revolved. The bottom of the pan has a lining, called the die, upon which the grinding is done. The muller is attached to a revolving vertical shaft by means of a spider and can be raised or lowered. The shaft is revolved by gearing below the pan.

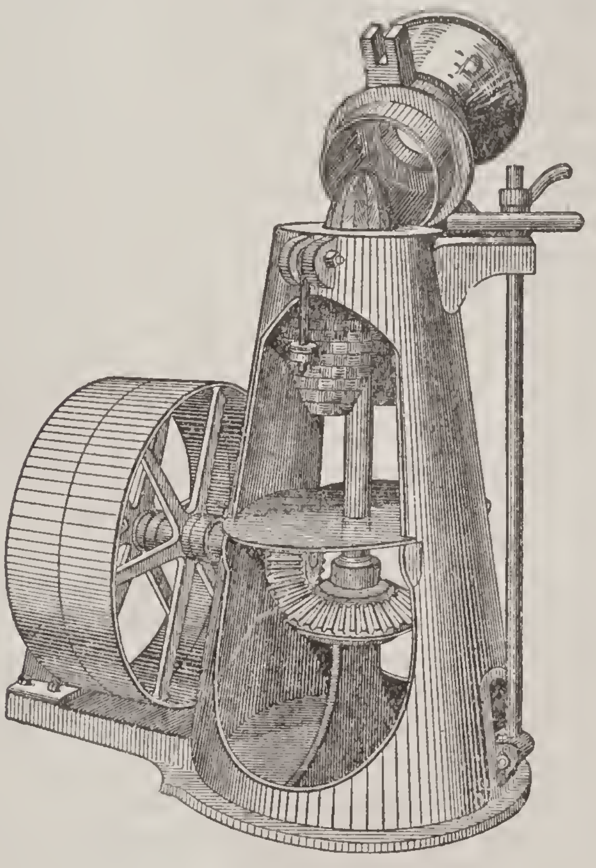


Fig. 9. COFFEE MILL.

Coffee Mill.—Used for pulverizing ore samples in laboratories, fertilizers, drugs, etc. It consists of a conical head keyed to a vertical revolving shaft, which in turn rests on a movable step so that the head can be raised or lowered, thereby regulating the size of discharge. The upper portion of the head is corrugated. The head revolves in a die consisting of a double cone, the upper portion of which is corrugated. The coarse crushing is done between the corrugated conical surfaces of the head and die, and the pulverizing between the smooth surfaces.

Carr Disintegrator.—Originally invented in England, known in the United States as the Stedman and in Germany as the Brink and Hübner. It is an impact pulverizer for soft or friable material, such as coal. It consists of a nest of revolving cages, made of round bars of iron; adjacent cages revolve in opposite directions. The material, which is fed into the inner cage, is broken, discharged between the bars by centrifugal force, and then receives an impact from the bars of the superimposed cage revolving in the opposite direction; this operation is repeated until the material is finally discharged through the outer cage.

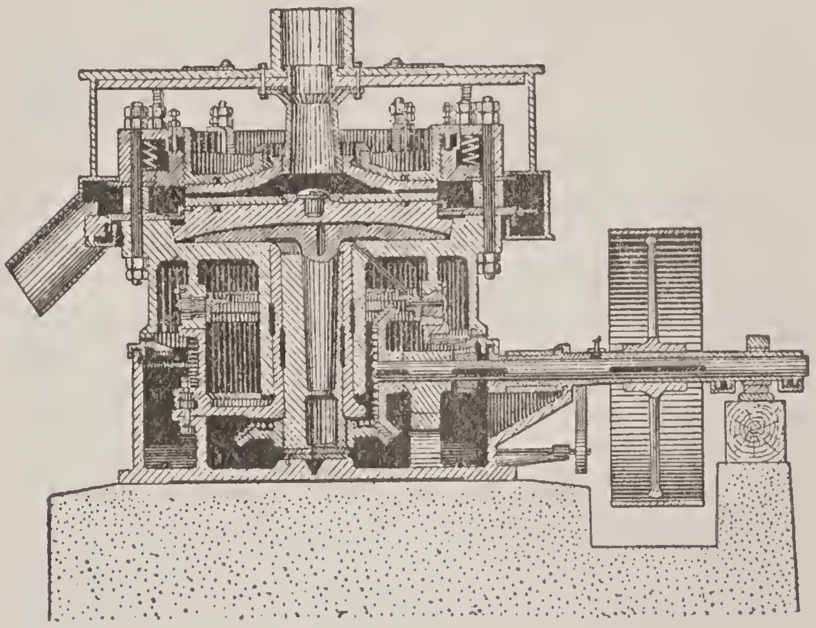


Fig. 10. SYMONS DISK PULVERIZER (VERTICAL SECTION).

Symons Disk Pulverizer.—Although these machines are but recently invented and only three of them were in use in 1913, the success which they have obtained warrants their description. They consist of two revolving disks, set horizontally. The lower disk rests on a sliding wedge which is attached to a vertical shaft revolving in an eccentric. As the eccentric is revolved, the wedge is gyrated, thereby transmitting a circular wave motion to the lower disk, causing a crushing action. Both disks revolve at the same speed. The ore is fed into the hopper, falls between the disks, is thrown out by centrifugal force to where the disks are farthest apart, crushed, and discharged by centrifugal force.

Hammer Pulverizers.—These machines are of the impact type and used for pulverizing soft material, such as coal, bones, drugs, etc. They consist of hinged beater arms revolving at high speed. The beater arms act as hammers thrown out against the material by centrifugal force.

The arms are incased in a suitable hood containing a screen through which the pulverized material is discharged.

Bogardus Eccentric Mill.—For the pulverizing of drugs, fertilizers, bark, oil cake, sugar, etc., the Bogardus eccentric mill, invented in 1832 by James Bogardus, is largely used. It consists of two circular horizontal grinding plates, placed eccentrically with each other so that no two parts come in contact consecutively. The grinding plates may be either smooth or grooved; when grooved, a cutting action takes place upon the material to be crushed.

Buhr Stones, or *Gristmills.*—Used for pulverizing flour, drugs, etc. It consists of two horizontal stone disks, of which only one revolves. The grinding surfaces of the stones are furrowed, resulting in a grinding and cutting action. The material to be pulverized is fed through the centre of the upper stone, passes between the stones, and is discharged at the circumference. The stones may be a natural quartzose rock, cemented quartz stones, or may be made of emery. See Flour.

Consult: Richards, *Ore Dressing* (4 vols., New York, 1903); Rickard, *Stamp-Milling of Gold Ores* (ib., 1897); J. V. Woodworth, *Grinding and Lapping Tools, Processes, and Fixtures* (ib., 1907); Darbyshire, *Precision Grinding* (ib., 1907); Colvin and Stanley, *American Machinist Grinding Book* (ib., 1912).

GRINDING SPAR. See Corundum.

GRIN′DLE. One of the many quaint local names, more fully "John A. Grindle," given in the southern Mississippi valley to a strange fish, the mudfish (*Amia calva*), elsewhere described under Bowfin.

GRIND′LEY, Harry Sands (1864–). An American chemist and food specialist, born at Champaign, Ill. He graduated in 1888 from the University of Illinois, where, after gaining the degree of Sc.D. at Harvard (1894), he taught chemistry, becoming professor of general chemistry and director of the chemistry laboratory in 1904 and professor of animal chemistry and chief animal chemist in 1907. He directed investigations of saltpetre in meat in 1907–10, and was a member of the Pellagra Commission of Illinois, and of the University commission for the study of methods relating to human nourishment. He is author of more than 40 bulletins and magazine articles on methods of cooking flesh, on meat preservatives, and on the nutritive value and chemistry of meat.

GRIND′STONE. A flat, circular stone made to revolve upon an axis and used for grinding steel, glass, and other stones, etc. Grindstones are of various degrees of coarseness, according to the purpose for which they are to be used. Grindstones are usually mounted more or less simply, but the large stones employed in cutlery manufacture are turned by machinery at a speed as great as practicable without bursting the stone by the centrifugal force. Grindstones are commonly made of a siliceous sandstone, in which the grains are sharp and there is little cement to bind them together. The surface is thus prevented from wearing smooth. Some of the best grindstones in the United States come from Berea, Ohio, and are obtained from certain layers of the Carboniferous sandstone, or Berea grit. Artificial grindstones of very uniform and perfect texture are made from emery (q.v.); they are much used for work on metal surfaces, dispensing with slow and laborious hand filing. Emery wheels are made as large as 3 feet in diameter, and so strong that they can be driven at 6000 feet per minute, when they will readily cut tempered steel. Grindstones are now also made of carborundum, which ranks next to the diamond in hardness. These are coming into large use for cutting and polishing precious stones. See Millstone; Abrasives.

GRIND′STONE ISLAND. 1. An islet of Albert Co., New Brunswick, Canada, in Chignecto Bay. It takes its name from its quarries of grindstone, of which large quantities are exported to the United States. 2. One of the Magdalen Islands (q.v.).

GRINGO, grĭn′gō (Sp., gibberish, possibly a popular variation of *Griego*, Greek). A contemptuous term applied to an American or Englishman by Mexicans and South Americans.

GRINGOIRE, grăɴ′gwär′, or **GRINGORE**, grăɴ′gôr′, Pierre (?1475–1538 or 1539). A French poet and dramatist of the court of Louis XII, born at Caen. As a poet, he began by putting forth moral allegories. He was first to use the stage for contemporaneous political satire. He was a leading member of the theatre company known as *Enfants sans souci*, in Paris, and took a conspicuous part in the production of mysteries. His most noted topical drama, in which King Louis XII himself is said to have taken a hand, is *Le jeu du prince des sots* (1511), directed against Pope Julius II. This and *Le mystère de Saint-Louis* (about 1525) were his most important creations, the former illustrating the full development of the mediæval type of play, with its coarse, farcical morality. Gringoire was distinguished for his dry wit and clever vivacity. He was the most prolific purveyor of farcical dramas for the important festivals of the kingdom. He finally went into the service of the Duke of Lorraine and in his latter days wrote religious or spiritual poetry. His *Œuvres* were brought out in Paris in 1858–77. Victor Hugo made Gringoire an interesting character in *Notre Dame de Paris.* Banville also made of him a leading figure in a comedy called *Gringoire* (1866). In both cases, however, the authors had little regard for the true character of the poet or the facts in connection with his career. His best-known works are: *Le chasteau de labour* (1499), in which the three allegorical enemies of marriage are named—Need, Care, and Discomfort; *Les folles entreprises* (1505); *La chasse du cerf des cerfs* (1510), a parody of the Pope's title *servus servorum.* Consult: Picot, *Gringoire et les comédiens italiens* (Paris, 1878); Badel, *Pierre Gringoire, poète français* (Nancy, 1893); Oulmont, *Etude sur la langue de Pierre Gringore* (Paris, 1911); id., *La Poésie morale, politique et dramatique à la veille de la Renaissance, Pierre Gringore* (ib., 1911).

GRINNELL, grĭn-nĕl′. A city in Poweshiek Co., Iowa, 55 miles east by north of Des Moines, on the Chicago, Rock Island, and Pacific and the Minneapolis and St. Louis railroads (Map: Iowa, E 3). It has manufactures of gloves, automobiles, washing machines, aëroplanes, liquid soap, leggings, gaiters, and carriages, is the seat of Grinnell College (q.v.), and contains a Carnegie library. Grinnell is governed under the charter of 1882, which provides for a mayor, elected biennially, and a unicameral council. The city owns and operates its water works. Settled in 1854, Grinnell was incorporated in 1865 and in 1882 was chartered as a city of the second class. In that year it suffered from a disastrous cyclone. Pop., 1900, 3860; 1910, 5036.

GRINNELL, Henry (1799–1874). An American merchant, born in New Bedford, Mass., and educated at the academy in that place. In 1818 he removed to New York, where he began a mercantile career. In 1826 he became a member of the firm of Fish and Grinnell, in which an elder brother was a partner, and in 1828 became head of Grinnell, Minturn & Co., which for over 30 years was one of the most prosperous shipping firms in the country. He retired from active business in 1852, although in later life he was interested in the insurance business. He is best known for his interest in and liberal support of Arctic exploration. Participating in the general anxiety regarding Sir John Franklin and his squadron, and moved by the appeals of Lady Jane Franklin for American assistance, Grinnell furnished the funds for the outfitting of an expedition under officers of the United States navy. Lieut. E. J. De Haven was sent in command, and Elisha Kent Kane served as surgeon. Sailing via Davis Strait, Baffin Bay, and Lancaster Sound, De Haven joined the English searching squadrons at Beechy Island. Sailing up Wellington Channel to lat. 75° 24′ N., De Haven discovered hitherto unknown regions, to which he gave the name of Grinnell Land. In 1853, with George Peabody, Grinnell fitted out a second Franklin relief expedition, which, under Dr. Kane (q.v.), discovered Kane Sea and the waterways, as far north as Kennedy Channel, which separate Greenland and Grinnell Land. On the Greenland coast Cape Constitution was reached, lat. 80° 35′ N., while the shores of Grinnell Land were traced to Cape Frazer, lat. 79° 43′ N. Grinnell also contributed to the Hayes expedition of 1860 and the *Polaris* expedition of Captain Hall in 1871. He was one of the founders and from 1861 to 1864 president of the American Geographical Society.

GRINNELL COLLEGE. An institution of higher learning, founded in 1847, at Grinnell, Iowa. It is coeducational and nonsectarian. It includes a college department and the School of Music. The total number of students in 1914 was 512 in the college and 192 in the School of Music. The faculty numbered 50. The value of the grounds and buildings was about $545,000, and the total assets were about $2,000,000. The annual income is about $130,000. The library contains 50,000 volumes. The president in 1914 was John Hanson Thomas Main, Ph.D.

GRINNELL LAND. A vast region in the Arctic Ocean, known in Europe as Ellesmere Land, situated west of Greenland, from which it is separated by the Kennedy Channel. Its northern part is known as Grant Land, and in the south it is continuous with Ellesmere Land (Map: Arctic Regions, G 6). Its highest point is Mount Arthur (4500 feet). The greater part of the region is covered with ice caps, although the seaward-trending valleys are free from snow in summer and covered with Arctic vegetation. The fauna of the region includes the musk ox, reindeer, wolf, fox, hare, lemming, and ermine. The land was first visited by Dr. I. I. Hayes in 1854 and again in 1861. It was explored by the British expedition under Nares in 1875–76, by Greely in 1882, by Lockwood and Brainard in 1883, and by Peary several times. The glacial-lake system (Lake Hazen), discovered by Greely in 1882, is unique as a habitable region, being in lat. 82° N. Its snow-free area of 1000 square miles, covered with luxuriant vegetation, affords pasturage for deer and musk oxen. In this region were found remains of the most northerly permanent habitations. Except Greenland, Grinnell Land is the most northerly region of the world. Consult Greely, *Three Years of Arctic Service* (2 vols., New York, 1886), and Sverdrup, *New Land: Four Years in the Arctic Regions* (ib., 1904).

Lieutenant De Haven in 1850 discovered another Grinnell Land, which later proved the northwestern portion of North Devon, and named it after Henry Grinnell (q.v.).

GRIPE, grīp (from *gripe*, AS., OS. *grīpan*, Goth. *greipan*, OHG. *grīfan*, Ger. *greifen*, to seize; connected with Lith. *greibti*, to seize). In a wooden ship, a timber bolted to the stem and keel at the place where the two join. A vessel sailing close-hauled gripes when she has a tendency to come up into the wind despite the action of the helm. It is caused by insufficient head sail, too much after sail, or improper trim; if the latter, she is too much down by the head, which may be corrected by shifting ballast from forward aft. A slight tendency to gripe is desirable, as it makes a ship tack easily and surely. Broad bands of plaited rope or canvas used for securing boats at the davits are also called gripes; they pass partly around the boat and have the ends lashed to the rail or strongback on the davits.

GRIPENBERG, grē′pen-bĕrg, Oscar Casimirovitch (1838–). A Russian soldier. He fought in the Crimean War, during the Polish insurrection of 1863, in Turkestan, and as commander of a regiment of Guards in the Russo-Turkish War, rising to be general of infantry. In September, 1904, he received command of the second Manchurian army, organized after the decisive Russian defeat at Liao-Yang. (See Russo-Japanese War.) In January, 1905, with a force estimated at about 80,000 men, he began an attack on the weak Japanese left. He was at first successful, but finally was obliged to retreat with enormous loss. Declaring that he had failed to receive adequate support from General Kuropatkin, he resigned his command a few days after the battle.

GRIPPE, grĭp (Fr. *la grippe*). An infectious disease characterized by fever, catarrhal affections of the respiratory and digestive systems, and nervous disorders. See Influenza.

GRIQUALAND (grē′kwȧ-lănd) **EAST.** A native territory of the Cape Province, South Africa, bounded northeast by Natal, southeast by Pondoland, south by Tembuland, west by Barkly East, and northwest by Basutoland (Map: Cape of Good Hope, J 8). Area, 7594 square miles. Pop., 1911, 249,038, including 7944 whites. Since 1875 it has been under the jurisdiction of the Cape. Capital, Kokstad, named after Adam Kok, a Griqua chief, who went to the district with 15,000 Griquas, a hybrid race of Dutch and native origin.

GRIQUALAND WEST. A northern district of the Cape Province, South Africa, bounded north and west by Bechuanaland, east by the Orange Free State, and south by the Orange River (Map: Cape of Good Hope, F 7). Area, 15,197 square miles. Pop., 1891, 83,375, including 29,670 whites; 1904, 108,498, including 32,570 whites. Its famous diamond fields were discovered in 1867, when the territory belonged to Waterboer, a native chief. The disturbances caused by boundary disputes with the Orange Free State and Transvaal Republic resulted in Waterboer's consent to the annexation of Griqualand by Great Britain in 1871. It was incorporated as four of the 77 divisions of Cape Colony on Oct. 1, 1880. The principal towns are Kimberley (capital), De Beers, Griqua Town, Douglas, Belmont, and Barkly.

GRIQUAS, grē′kwȧz. Half-caste Dutch-Hottentots of Griqualand East and West, South Africa. Formerly they lived farther south in the Cape Province, but about the middle of the last century they migrated beyond the Orange River under their chiefs Waterboer and Adam Kok. Subsequently the latter, with some followers, moved east to the district now known as Griqualand East. The country of the Western Griquas is a desolate upland 4000 feet in altitude, but contains the richest diamond fields in the world. The Griquas are an interesting example of a racial mixture transplanted to an isolated habitat and thus taking the first step in the formation of a distinct race of mankind.

GRISAR, grẻ′zär′, Hartmann (1845–). A German Catholic historian, born in Coblenz and educated at Münster and Innsbruck. In 1868 he became a priest and entered the Society of Jesus and in 1871 became professor at Innsbruck. His important works on mediæval history and the period immediately after the Middle Ages include: *Galileistudien* (1882); *Gechichte Roms und der Päpste im Mittel-Alter* (1900; Italian, 1899–1907; French, 1906; English, 1911–12); *Das Mittel-Alter einst und jetzt* (1902; 3d ed., 1903); and *Luther* (1911–12; in English, 1913), which roused Protestant biographers to reply.

GRIS′COM, Clement Acton (1841–1912). An American financier, born in Philadelphia. He received an academic education, became clerk in 1857 and partner in 1863 in the firm of Peter Wright and Sons, shipping merchants, a connection in which he began his pioneer work in the exporting of petroleum. In 1871 he started the operation of the American line of steamships, at that time the only line carrying the American flag; later he organized and was supervisor and general manager of the International Navigation Company; and with J. Pierpont Morgan he organized in 1902 the International Mercantile Marine Company, of which he was president until his retirement in 1904, and chairman of the board of directors until 1908. He also held directorates in the Pennsylvania Railroad Company, the United States Steel Corporation, and other companies. He was a president of the American Society of Naval Architects.

GRIS′COM, John (1774–1852). An American educator. He was born at Hancock's Bridge, Salem Co., N. J., was educated at the Friends' Academy, Philadelphia, and for 13 years was principal of a Friends' school in the same city. Then for 35 years he taught in New York City, where he projected and, in 1825–31, supervised the New York High School. He was also one of the founders and the secretary of the Society for the Prevention of Pauperism. He helped to establish the medical department of Rutgers College, where in 1812–28 he was professor of chemistry and natural philosophy. He made a tour in Europe to inspect institutions of charity, reform, and education, and published his observations in *A Year in Europe* (1823), one of the most influential educational works of the first half of the nineteenth century. On his return he became a propagandist of Pestalozzi's doctrines. He also wrote *Monitorial Instruction* (1825). Consult a *Memoir* of Dr. Griscom by his son (New York, 1859), and W. S. Monroe, *History of the Pestalozzian Movement in the United States* (Syracuse, 1907).

GRISCOM, Lloyd Carpenter (1872–). An American diplomat, born at Riverton, N. J. He graduated in 1891 from the University of Pennsylvania and studied law there and at the New York Law School. In 1893–94 he was in England as secretary to Ambassador Bayard; in 1897 he was deputy district attorney of New York; and during the Spanish-American War he served as captain and assistant quartermaster. After a short period as Secretary of Legation and chargé d'affaires at Constantinople, he became Minister to Persia in 1901. He held the corresponding post in Japan (1902–06) and was Ambassador to Brazil (1906–07) and to Italy (1907–09). In 1911 he became a member of the law firm of Beekman, Menken, and Griscom, New York City, and was thereafter active in local Republican politics. He contributed numerous articles to the Philadelphia *Sunday Press* on travel in Central America.

GRIS′DALE, John (1845–). A Canadian Anglican bishop. Born in Bolton, England, educated at the Church Missionary College, Islington, and ordained a priest of the Church of England in 1872, he went to India and for a short time was a master in St. John's College, Agra, and also assistant minister in the Old Church, Calcutta. On his return to England he became curate of Broomfield; but, removing to Manitoba in 1873, he was thereafter incumbent in Winnipeg of St. Andrew's, Holy Trinity, and Christ churches until 1882; also professor of systematic theology in St. John's College and canon of St. John's Cathedral; in 1882–96 dean of Rupert's Land and professor of pastoral theology in St. John's College; and after 1896 Bishop of Qu'Appelle. In 1895 he was a delegate to the General Convention of the Protestant Episcopal church of the United States; in 1897, to the Lambeth Conference, London; in 1908, to the Pan-Anglican Congress, London. He became a councilor and an examiner in Manitoba University and a senator of the University of Saskatchewan. In 1905 he was an unsuccessful candidate for the bishopric of Rupert's Land.

GRISEBACH, grē′*ze*-bäG, August Heinrich Rudolf (1814–79). A German traveler and botanist, born at Hanover, and educated at Göttingen and Berlin. He was appointed extraordinary professor at Göttingen in 1841, regular professor in 1847, and in 1875 director of the botanical garden. Several of his works are devoted to discussions of the flora of the West Indies and of the American tropics. They include: *Spicilegium Floræ Rumelicæ* (2 vols., 1843–45); *Die Vegetationslinien des nordwestlichen Deutschlands* (1847); *Systematische Untersuchungen über die Vegetation der Karaiben* (1857); *Flora of the British West Indian Islands* (1859–64); *Die Vegetation der Erde nach ihrer klimatischen Anordnung* (2d ed., 1884).

GRISEBACH, Eduard (1845–1906). A German diplomat and author, son of the preceding. He was born and educated at Göttingen and was Vice Consul in the German diplomatic service at Smyrna, Bucharest, St. Petersburg, Milan, and Port-au-Prince, Haiti. He first attracted attention by his works *Der neue Tann-*

häuser (20th ed., 1901), a series of loosely connected poems, and *Tannhäuser in Rom* (7th ed., 1890), a novel in verse, published anonymously. His other works include: *Die deutsche Litteratur seit 1770* (4th ed., 1886); *Die treulose Witwe*, in which the author traces the travels of a Chinese fable through the literature of the world (5th ed., 1886); *Das Goethische Zeitalter der deutschen Dichtung* (1891); *Kin-Ku-Ki-Kuan: Neue und alte Novellen der chinesischen Tausendundeine Nacht* (1880); *Chinesische Novellen* (1884). His editions of Bürger and Lichtenberg and his text revisions of Schopenhauer's works, including many posthumous manuscripts of the great philosopher, are important.

GRISELDA, grĭ-zĕl′dȧ, or **GRISELDIS**, grĭ-zĕl′dĭs. The heroine of one of the most popular mediæval legends, which probably arose in Italy. A poor girl, a shepherdess, by her beauty and virtues wins the love of the Marquis of Saluzzo, who marries her and then puts her humility and obedience to the severest tests, from which she emerges triumphant. The story (said to be founded on fact) is first told in Boccaccio's *Decameron* (the Tenth Novel of the Tenth Day). Petrarch translated Boccaccio's version into Latin in 1373, under the title *De Obedientia et Fide Uxoria;* and in the fourteenth century the story was well known throughout Europe. In the year 1393 it was in Paris elaborated into a "mystery" play, *Le mystère de Griseldis, Marquise de Saluces*, of the original edition of which there remains but one copy, that of the Bibliothèque Nationale, Paris. To about the same time belong several French prose versions, such as *Le menagier de Paris.* In England the story was told by Chaucer in his *Clerke's Tale*, in the version given by Petrarch; there is a reference to *Patient Griselda* by Lydgate in his *Temple of Glass;* there are indications of ballads and stories about *Pacyent Gressell* during the sixteenth century, and some ballads of a later date, still preserved, also deal with the subject, e.g., *Lord Thomas and Fair Anne;* and finally there is the play, *The Pleasant Comedie of Patient Grissill* (1599), of which Thomas Dekker was one of the collaborators. Hans Sachs's *Geduldige und gehorsame Griselda* appeared in Germany in 1546. In 1691 Perrault inserted the tale in the *Contes de ma mère l'oye.* Versions of the story are also found in the literatures of Holland, Bohemia, Sweden, Iceland, etc. *Markgraf Walther* has lately been reproduced in Schwab's *Buch der schönsten Geschichten und Sagen.* Consult: Wistenholz, *Die Griseldissage in der Litteraturgeschichte* (Heidelberg, 1888); Chaucer Society, *Originals and Analogues of Chaucer,* part ii (London, 1875); Child, *English and Scottish Ballads,* vol. iv (Boston, 1882); Warton, *History of English Poetry,* ed by Hazlitt, vol. iv (London, 1870); *The History of Patient Grisel, 1619,* ed. by Wheatley (ib., 1885); Leroux de Lincy, introduction to *La bibliothèque bleue* (Paris, 1847); Widmann, *Griselidis in der deutschen Literatur des XIX. Jahrhunderts* (Tübingen, 1905); Schuster, *Griselidis in der französischen Literatur* (ib., 1909), which contains a bibliography; and the forthcoming catalogue of Petrarch collection at Cornell (ed. by Fowler).

GRISETTE, grē̇′zĕt′ (Fr.). A sort of woolen cloth, so called from its gray color, frequently worn by the French women of the lower class. Hence the name is applied to young women employed as shop girls, sewing girls, chambermaids, etc. It is also used in a more special sense by foreigners to designate young women of this class in Paris of doubtful character.

GRISI, grē′zē̇, Giulia (1811–69). A famous Italian dramatic soprano. She was born in Milan and was a pupil of Giacomelli, Madame Pasta, and Marliani. She was one of the greatest singers of the nineteenth century and was at the height of her fame during the period of 1834–49, when she was the unquestioned prima donna of the Parisian and London operatic stage. In 1836 she married Count Melcy, from whom she was afterward divorced, later marrying her principal operatic support, Mario, the famous tenor, with whom she made a tour of the United States in 1854. She died in Berlin.

GRIS-NEZ, grē̇′nȧ′, Cape. A headland of France, in the Department of Pas-de-Calais, extending into the Strait of Dover, and 21 miles southeast of Dover, England (Map: France, N., G 2). Cape Gris-nez is about equidistant from Calais on the northeast and Boulogne on the south. It has a lighthouse.

GRISON, grī′son (Fr., gray), or Huron. A large, plantigrade, musteline mammal (*Galictis*, or *Grison, vitata*) of South and Central America, weasel-like in form, and about 2 feet long without the tail, which is about a foot long. Its coloration is peculiar in that it is light above and dark below—coal black, except on the top of the head, back, and tail, where the hair is long and gray. The sharp contrast between the gray crown and the black face gives the animal a singular and rather vicious aspect. It is savage in disposition and when irritated gives a barking squeal and emits a pungent odor more disgusting than that of a skunk. It lives in hollow trees, clefts in rocks, and holes in the ground, and frequents plantations and the neighborhood of buildings. A larger and less common, but otherwise similar, species is Allemand's grison (*Galictis*, or *Grison, allemandi*). Cf. Tayra.

GRISONS, grē̇′zôɴ′ (Ger. *Graubünden*, It. *Grigioni*, Romansh *Grischuns*). The largest, the most easterly, and the most thinly inhabited of the cantons of Switzerland. It is bounded on the north by the cantons of Glarus and Saint-Gall, and by Liechtenstein and Vorarlberg; on the east by Tirol; on the south by Lombardy; and on the west by the cantons of Ticino and Uri (Map: Switzerland, D 2). Its area is 2746.5 square miles (7113.5 square kilometers). The surface of the canton is broken by mountains. The Glarner Alps border on the northwest, and the Bernina on the southeast. The Leopontine Alps enter from the west, the Adula group being in the southwestern part of the canton. In the east is the Rhætian Range. There are two large valley districts, of which the first and most important lies along the course of the Hither Rhine and occupies the northwestern portion of the canton; and the second, that of the Inn, forming the Engadine (q.v.), extends through the southeastern and eastern parts. In the southern or southeastern sections are the valleys belonging to the basins of the Ticino, Adda, and Adige. Waters rising in the canton find their way ultimately to the North, Adriatic, and Black seas. The lakes are small, the largest being the Silsersee of only 4 square kilometers. The climate is quite varied. In some districts winter reigns for nearly eight months, while the climate in the southern valleys is like that of the northern border of Italy. The upper valleys, particularly the Engadine and Davos, attract invalids from all the civilized world. Among the many famous "air-cure" resorts are Davos-Platz and Saint-Moritz. The village of Juf (6998 feet) is the highest permanently inhabited village in the Alps.

Of the total area of 7113.5 square kilometers, 69.5 per cent, or 4941.7 square kilometers, is reported as productive, and 30.5 per cent, or 2171.8 square kilometers, as unproductive. Of the productive area, 3545.2 square kilometers were agricultural, grazing, etc., 1393.1 in forest, and 3.3 under the vine; of the unproductive area, 11.9 square kilometers comprised lakes of over 10 hectares. In the colder districts crops of barley and rye are raised with difficulty. In the southern valleys, however, wheat, corn, the vine, and almonds are successfully cultivated. The pastures and forests are the chief sources of wealth; in 1911 cattle numbered 78,499. Cattle, skins, timber, and cheese are the principal exports. The rivers abound in salmon and trout, and in the mountains are deer, chamois, bears, and other game. The mineral deposits are nearly exhausted. Rare varieties of marble are quarried, and there are numerous mineral springs. The manufacturing industries are unimportant and are confined chiefly to the production of cotton goods, leather, and beer. The railway mileage is small, but there are many good roads in every part of the canton. The legislative power is in the hands of the Grosser Rat (Great Council), consisting of members elected at the rate of one for every 1300 inhabitants. The executive power is vested in a council of five elected members. The obligatory and the facultative referendum and the initiative are in force. The existing constitution of the Grisons was adopted in 1892 and became operative Jan. 1, 1894. There are 14 administrative districts, which are subdivided into 39 circles, and these into 224 communes. The cantonal finances are on a safe and self-adjusting basis, owing to the rather unique fact that the land tax must each year cover any deficit. The de facto population has been as follows: 1850, 89,895; 1870, 91,782; 1888, 96,235; 1900, 105,065; 1910 (census of December 1), 119,698. The legal, or resident, population in 1910 was 117,710. The number of persons returned in 1910 as Protestant was 61,087; Roman Catholic, 57,552. The population having German as the mother tongue numbered 58,465; Romansh (including Ladino), 37,147 (the total for Switzerland was 39,834); Italian, 20,963; French, 838. Emigration is small (152 in 1912). Births (including stillbirths), in 1911, 3014; deaths (excluding stillbirths), 2064; stillbirths, 76. Primary schools, in 1910, 275, with 523 teachers (of whom 467 male) and 15,479 pupils; secondary schools, 44, with 53 teachers (of whom 52 male) and 1190 students. There are no large towns. The Commune of Chur (Coire), the capital and chief town, had in 1910 a population of 14,814; Davos, 11,744; Saint-Moritz, 3310.

The canton constituted a part of the ancient Rhætia, which was subdued by the Romans in the reign of Augustus. From the Goths, who overran the country about 490 A.D., it passed into the power of the Frankish kings, and by the Treaty of Verdun (843) was included in the portion of Louis the German, forming a part of the Duchy of Alemannia. During the early Middle Ages the peasantry suffered cruelly from the oppression of their feudal nobles, whose perpetual strife often brought devastation upon the country. With the rise of free towns some attempt was made to check the feudal anarchy by associations of burghers, acting in alliance with the great ecclesiastical lords, chief of whom was the Bishop of Chur, or Coire. In 1367 the cathedral chapter of Coire and the inhabitants of the diocese formed the *Gotteshausbund*, to check the Bishop and to maintain the independence of the bishopric against the Hapsburgs, to whom the Bishop had sworn allegiance; the latter was soon forced to join the *Bund*. In 1395 the *Oberbund* (also called the *Grauer Bund*) was organized in the upper Rhine valley. A third league, the *Zehngerichtenbund* (League of the Ten Jurisdictions), was formed in 1436, out of the possessions of the house of Toggenburg, whose last representative had just died. In the latter half of the fifteenth century these leagues formed a loose federal union, and between 1497 and 1567 all three had entered into alliance with the Swiss Confederation. In 1512 the inhabitants of Grisons succeeded in conquering Bormio, Chiavenna, and the Valtellina, in north Italy. The Reformation early made its way into Grisons. The bulk of the inhabitants included in the Gray League, however, adhered to the Roman Catholic church, and religious strifes long distracted the region. The claims of Austria to Prätigau and the lower Engadine were bought off in 1649–52. From that time to the end nearly of the eighteenth century the history of the country is one of petty strife between factions. In 1797 its Italian possessions were annexed to the Cisalpine Republic, and during the next two years it was the battlefield of the Russians, the Austrians, and the French. In 1803 it was constituted by Napoleon a member of the Swiss Confederation. Its history during the nineteenth century was principally one of constitutional reform, marked by progress in the direction of a closely centralized form of government.

Consult: Planta, *Geschichte von Graubünden* (Bern, 1892); Plattner, *Die Entstehung des Freistaates der Dreibünde* (Davos, 1895); Heierli, *Urgeschichte Graubundens mit Anschluss der Romerzeit* (Zurich, 1903).

GRISTMILL. See FLOUR.

GRISWOLD, grĭz'wold. A town in New London Co., Conn., 10 miles northeast of Norwich, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, H 3). It is in an agricultural and dairying region. Pop., 1900, 3490; 1910, 4233.

GRISWOLD, grĭz'wold, ALEXANDER VIETS (1766–1843). An American Protestant Episcopal bishop, born in Simsbury, Conn. He at first studied law; but in 1795 he was ordained to the ministry, and began preaching in three different towns, besides teaching school. In 1804 he became rector of St. Michael's Church, Bristol, R. I., and in 1811 was consecrated first Bishop of the Eastern Diocese, in which were included the States of Maine, Vermont, New Hampshire, Massachusetts, and Rhode Island. In 1830 he left St. Michael's to accept the rectorship of St. Peter's in Salem, as being more central for his Episcopal labors. His last public act was the consecration of his successor, Dr. Manton Eastburn. He published many sermons and *The Reformation and the Apostolic Office* (1843). Consult Stone, *Life of Bishop Griswold* (Philadelphia, 1844).

GRISWOLD, JOHN AUGUSTUS (1822–72). An American manufacturer and politician. He was born in Nassau, Rensselaer Co., N. Y., and when 17 years old went to Troy, where he entered the hardware business. After engaging for a number of years in the wholesale and retail drug trade, he became a partner in the Rensselaer Iron Company and was very successful. In March, 1875, he consolidated his works with the Albany Iron Works, to form the Albany and Rensselaer Iron and Steel Company. He was associated with C. H. Delamater in building the *Monitor,* which defeated the *Merrimac* in Hampton Roads, and in conjunction with two other citizens of Troy introduced the manufacture of Bessemer steel into the United States. Griswold was elected mayor of Troy in 1855. Upon the outbreak of the Civil War he aided in raising a number of infantry and cavalry regiments, one of which, the Griswold Light Cavalry, took his name. He was elected to Congress by the Democrats in 1863, but soon after changed his political creed and was twice reelected by the Republicans. In the House he supported the war measures of the government. He was nominated for Governor of New York in 1868, but was defeated by the Democratic candidate, John T. Hoffman.

GRISWOLD, MATTHEW (1714–99). An American jurist. He was born at Lyme, New London Co., Conn., the son of John Griswold, one of the wealthiest men in New England. He was admitted to the bar in 1743. In 1751 he was elected to the General Assembly, and in 1759 was chosen a member of the Governor's Council, in which he appeared as a champion of the rights of the colonies, and opposed the Stamp Act. He was appointed to the bench of the Supreme Court of Connecticut in 1766, became Chief Justice in 1769, and served until his election as Governor in 1784. He was Deputy Governor from 1771 to 1784 and was chairman of the Connecticut Committee of Safety in 1775. As Governor from 1784 to 1786 he did what he could to foster the national spirit in Connecticut, and was president of the convention that ratified the Constitution of the United States in January, 1788.

GRISWOLD, PUTNAM (1875–1914). An American singer (bass), born in Minneapolis, Minn. Originally he followed a business career. At the age of 22 he discovered his voice and began to study with a local teacher in California. In 1900 he went to London, where he was for two years a pupil of A. Randegger at the Royal College of Music. During the winter of 1902–03 he studied under Bouhy at Paris, the next winter under Stockhausen at Frankfort; and finally he completed his studies with Emerich at Berlin in 1905. His operatic début took place at Covent Garden, London, in 1901. During the summer of 1904 he sang at the Royal Opera in Berlin. After having sung the rôle of Gurnemanz in Savage's production of *Parsifal* in America (1904–05), he became in 1906 a regular member of the Berlin Opera. There he remained, appearing also as "guest" in various German cities, until he came to the Metropolitan Opera House in 1911, where through his wonderful interpretation of Wagner's heroes he immediately won public and critics. His sudden death on Feb. 26, 1914—due to an attack of appendicitis—came as a shock to his numerous admirers. He was the first American bass to sing the great Wagner rôles at the Metropolitan, and is to be compared with the most distinguished of his foreign predecessors. He had been a prime favorite in Berlin, where the critics had praised him as the greatest foreign interpreter of Wotan. He was twice decorated by Emperor William.

GRISWOLD, ROGER (1762–1812). An American politician, born at Lyme, Conn., the son of Matthew Griswold. He graduated at Yale College in 1780, and was admitted to the bar in 1783. He was a member of Congress from 1795 to 1805. In 1801 President Adams appointed him Secretary of War; but he declined the office, and was appointed judge of the Supreme Court of Connecticut in 1807, a position which he held until elected Lieutenant Governor in 1809. At the expiration of his term in 1811 he was elected Governor, and served until his death, in 1812.

GRISWOLD, RUFUS WILMOT (1815–57). An American critic and compiler, born at Benson, Vt. By serving an apprenticeship to a newspaper publisher, he acquired practical knowledge of printing and editing. Wearying of this work, he studied theology and preached acceptably as a Baptist minister, but finally turned to editing and compiling. He was associated from 1841 till his death with various magazines and journals, beginning with *Graham's* in Philadelphia. Besides his editorial work he compiled the once very popular and still useful *Poets and Poetry of America* (1842); *Poets and Poetry of England in the Nineteenth Century* (1845); *Prose Writers of America* (1846); *Female Poets of America* (1848); *Sacred Poets of England and America* (1849). Numerous other works, written singly or in collaboration, are now practically forgotten. He edited the first American edition of *Milton's Prose,* and as literary executor of Poe superintended the first edition of that poet's works (1850), to which he contributed a *Memoir* that was a subject of much controversy. Griswold was industrious and well meaning, but not discriminating in his criticism. Still he did important work in encouraging young writers and stimulating interest in American literature; and his correspondence, published by his son, W. M. Griswold (Cambridge, Mass., 1898), is of great value.

GRISWOLDVILLE, grĭz′wold-vĭl. A village in Jones Co., Ga., 10 miles east by north of Macon, on the Central of Georgia Railroad (Map: Georgia, C 3). On Nov. 22, 1864, it was the scene of a stubborn engagement between a brigade of Sherman's army under General Walcott and a division of the Georgia Confederate militia under General Phillips. The latter attacked and retired after several hours of fighting. The Federals lost 84 in killed, wounded, and missing, General Walcott being among the wounded. The Confederates lost 600. Pop., about 100.

GRIT. See SANDSTONE.

GRIV′ET (from Fr. *gri-s,* gray + *ve-r-t,* green). A small monkey (*Cercopithecus,* or *Lasiopyga, griseoviridis*), one of the guenons inhabiting northeastern Africa. It is olive green in color on the back, while the face and underparts are white, and the root of the tail is gray. A broad white band on the forehead distinguishes it from the vervet. These monkeys go about in small bands, are not numerous, and are docile, good-tempered, and intelligent in captivity. See GREEN MONKEY.

GRIZ′ZLY BEAR. See BEAR.

GROAT (Dutch *groot,* great). A name given in the Middle Ages to all thick coins, as distinguished from the "bracteates" (Lat. *bractea,* a thin plate or leaf), or thin coins of silver or gold leaf stamped so as to be hollow on one side and raised on the other. Groats differed greatly in value at different times and in different countries. The silver groat once current in England (introduced by Henry III) was equal to fourpence. The coin, though not the name, was revived in the modern fourpenny piece. Groschen were until lately current in Germany. The silver groschen, or *neu-groschen*, of Prussia and the Zollverein, was $\frac{1}{30}$ of a thaler, and was worth two cents, American; the *guter groschen* of Hanover was $\frac{1}{24}$ of a thaler, and was worth three cents, American.

GROAT'S-WORTH OF WIT, A, BOUGHT WITH A MILLION OF REPENTANCE. A tract by Robert Greene (q.v.) discovered after his death, together with a pathetic letter to his wife. It was licensed in 1592, but apparently not published until 1596. The story is in part autobiographical, and contains an allusion to Shakespeare as "an upstart crow."

GRÖBEN, grē′ben, OTTO FRIEDRICH VON DER (1657–1728). A German traveler, born at Pretten, Prussia. In 1675 he went to Italy and Malta and finally to the Orient, where he traveled for many years. In 1682 he was sent by Frederick William of Brandenburg to the western coast of Africa, where, in the following year, he founded Fort Grossfriedrichsburg, named in honor of the Great Elector, on the coast of Guinea. An account of his tours is published in his work entitled *Orientalische Reisebeschreibung des brandenburgischen adelichen Pilgers, nebst der brandenburgischen Schiffahrt nach Guinea und der Verrichtung zu Morea* (1694), the last-mentioned reference bearing upon the author's subsequent experiences in the wars of Poland and Venice against the Turks, during which he was a major general in the Polish service (1686–87). He was known also as a poet. He wrote an account of his travels in Palestine, in verse, in a work entitled *A History of the Life and Love of Bergonnen and the Virtuous Areta* (Dantzig, 1700).

GRÖBER, grē′ber, GUSTAV (1844–1911). A German scholar in Romance literature and linguistics. He was born in Leipzig, and was educated there. He was docent and assistant professor at Zurich (1871–74), then became professor at Breslau, and in 1880 went to the University of Strassburg. In 1877 he became editor of the *Zeitschrift für romanische Philologie*, and in 1888 began the publication, as editor in chief, of the *Grundriss der romanischen Philologie* (2d ed., vol. i, Strassburg, 1904–06), to which he contributed articles on Latin literature during the Middle Ages, and on the history of Romance philology. Gröber's other works include: *Die handschriftlichen Gestaltungen der Chanson de Geste von Fierabras* (1869); *Die altfranzösischen Romanzen und Pastourellen* (Zurich, 1872); *Carmina Clericorum* (7th ed., 1890); *Zur Volkskunde aus Concilbeschlüssen und Kapitularien* (1894); *Abriss der lateinischen Litteratur des Mittelalters* (1893); and *Abriss der französischen Litteratur des Mittelalters* (1897). In 1899 a *Festgabe*, composed of contributions of pupils and friends, was presented to him, bearing the title *Beiträge zur romanischen Philologie*.

GROCYN, grō′sĭn, WILLIAM (?1446–1519). An English Hellenist, supposed to have been the first publicly to teach Greek at Oxford. He was born at Colerne, Wiltshire, and, after studying at Oxford, visited Italy to pursue under Poliziano (q.v.) and Chalcondylas (q.v.) the study of Greek, at that time little cultivated in England. He received his appointment at Oxford about 1492. Grocyn was the friend of Linacre, More, William Latimer, Colet, and of Erasmus, who speaks of him as his *patronus et præceptor*. With the exception of an epigram on a lady who threw a snowball at him, and his Latin letter to Aldus Manutius, which is prefixed to Linacre's *Procli Sphæra* (Venice, 1499), no writings by Grocyn are known. Consult Burrows, in *Collectanea*, vol. ii (Oxford, 1890).

GRODEK, grō′dĕk. A town of the Austrian Crownland of Galicia, situated on a lake about 20 miles southwest of Lemberg (Map: Austria-Hungary, H 2). Its chief industry is the cultivation of flax and tanning hides, and there is trade in grain and flour. Pop. (town), 1890, 10,742; 1900, 11,845; (district), 1900, 71,482; 1910, 79,592. In the European War of 1914 this town was taken by the Russians during the Galician campaign. See WAR IN EUROPE.

GROD′NO. A government in the western part of European Russia, formerly a portion of Lithuania, bounded on the north by the Government of Vilna, on the east by that of Minsk, on the south by Volhynia, and on the west by Poland (Map: Russia, B 4). Area, 14,896 square miles. The land is in general flat, and belongs in the southwest to the basin of the Bug, a tributary of the Vistula, in the north to that of the Niemen, and in the southeast to that of the Dnieper. The extensive morasses in the south have been partly converted into pasture ground by draining; in the north are extensive pine forests. There are still many peat bogs. The soil is light and sandy, and in general fruitful. Over 2,000,000 acres can be cultivated. Rye is the principal agricultural product. Barley, oats, beans, wheat, tobacco, and potatoes are also extensively raised. Horses, cattle, and sheep are exported. The chief branches of industry comprise manufactures of woolen goods, silk, leather, tobacco, flour, and bricks. Pop., 1897, 1,616,630; 1911, 1,997,600. Capital, Grodno (q.v.).

In the eleventh century the Great Russians began to settle in this region, then a marshy plain covered with impregnable forests, and inhabited by the semisavage Yatviags. In the thirteenth century it became part of Lithuania; in the sixteenth century it was incorporated with Poland, and in the partition of that kingdom was annexed by Russia.

GRODNO. An episcopal city of Russia and the capital of the government of the same name, situated on the Niemen, 160 miles northeast of Warsaw, and 540 miles southwest of St. Petersburg (Map: Russia, B 4). It is divided by the river into two parts; the northern or city proper contains the extensive and handsome palace erected by Augustus II, and is connected with the southern part by an iron bridge. The city is poorly built; it contains among a number of ancient buildings the Bernardine Monastery, erected in 1494, and the parish church, built in seventeenth-century baroque style. The chief articles of trade are grain and timber, the latter being rafted down the Niemen. The principal industries include the manufacture of pottery, tobacco, vehicles, arms, paper boxes, soap, tallow candles, and machinery. It is the seat of the Second Army Corps. Pop., 1886, 39,900; 1901, 41,736; 1911, 66,507, two-thirds Jews.

During the last century of Polish rule Grodno was often the seat of the Diet. It was at Grodno that the second partition of Poland was agreed upon in 1793. The town passed to Russia in 1795. It was occupied by the French in 1812.

GROEN VAN PRINSTERER, grōōn vȧn prĭn′stẽr-ẽr, GUILLAUME (1801–76). A Dutch statesman and historian, born at Voorburg. He studied law and letters at Leyden, and took a degree in each course, with dissertations *De Juris Justiniani Præstantia* and *De Prosopographia Platonica* (both, 1823). His earliest historical work, *Verspreide geschriften*, appeared in 1826. Three years afterward he was appointed private secretary to William I, but resigned in 1833 to devote himself more closely to his duties as editor of *Nederlandsche Gedachten* and to historical study. He published at this period *Archives, ou correspondance inédite de la Maison d'Orange-Nassau* (1835–47; continued, 1857–61), and a *Handboek der geschiedenis van het Vaderland* (1841–46). In 1840 he wrote *Bijdrage tot de herziening der grondwet in nederlandschen zin.* He was elected to the House of Deputies in the same year, and was again chosen deputy in 1849, keeping his seat almost continuously until 1865. His works, besides those mentioned, include: *Ongeloof en revolutie* (2d ed., 1868); *De Nederlander* (1850–55); *La Prusse et les Pays-Bas* (1867); and the historical memoir *Maurice et Barnevelt* (1875). Consult Stuart, *In Memoriam: notice biographique* (Utrecht, 1876), and Vos, *Groen van Prinsterer en zijn tijd* (2 vols., Dordrecht, 1886–91).

GROESBECK, grōōs′bĕk, WILLIAM SLOCOMB (1815–97). An American politician, born in New York City. He graduated at Miami University, Oxford, Ohio, in 1835, and opened a law office in Cincinnati. He was a member of the State Constitutional Convention in 1851, and the next year was appointed a member of the commission to codify the laws of Ohio. He represented his district as a Democrat in Congress from 1857 to 1859; was a member of the Peace Congress in 1861, a delegate to the Union National Convention in Philadelphia in 1866, and one of the counsel for President Johnson during the impeachment trial in 1868, after the retirement of Jeremiah S. Black from the case. In 1872 he was nominated for President by the Liberal Republicans. He received one electoral vote for Vice President. In 1878 he was appointed United States delegate to the International Monetary Congress at Paris.

GROETE. See GROOTE.

GRO′GAN, EWART SCOTT (1874–). A British military officer, scientist, and traveler, born at Winchester and educated at Jesus College, Cambridge. He made trips of exploration in Africa, Australasia, America, and the South Pacific, in 1895–97 was in South Africa and fought against the Matabele, and in 1898–1900, with Arthur Sharp, crossed Africa from south to north by way of the great central lakes and the Nile, a notable achievement, described by the two travelers in *From the Cape to Cairo* (1900). Later he became captain of the Fourth Royal Munster Fusiliers. He wrote also *The Economic Calculus and its Application to Tariff* (1909).

GROINED VAULTING (from *groin*, earlier *grine*, variant of *grain*, from Icel. *grein*, branch of a tree). In architecture, that vaulting in which two barrel vaults intersect each other at right angles; the arris or salient edge formed at the lines of intersection is called the groin. When the vaults are of equal span and semicircular section, the groins describe semiellipses; but the intersecting vaults may be of various sections and relative spans. Groined vaulting may be carried on isolated piers or columns, and be thus employed to cover any desired area. It was first so employed by the ancient Romans; in their *thermæ* it appears on a colossal scale. It was used in various forms by the Byzantines, building with brick, and by the Romanesque architects, building in stone; they made it the distinctive feature of their church architecture, and introduced the practice (found in germ, however, in both Roman and Byzantine vaults) of building intersecting groin ribs along the lines of the groins, which with other ribs supported the fillings between them. The Gothic architects, using the pointed arch, further perfected the ribbed groined vault. See VAULTING.

GROLIER (grō′lyȧ′) **CLUB**. A celebrated society of bibliophiles, founded in New York City in January, 1884. The club is named after Jean Grolier de Servières, Viscount d'Aguisy, Treasurer General of France, whose library was famous. The objects of the club are literary study and the promotion of the arts of typesetting printing, and binding. The founders of the club, who have also been largely instrumental in its success, were William L. Andrews, Theodore L. De Vinne, A. W. Drake, Albert Gallup, Robert Hoe, Brayton Ives, Samuel W. Martin, E. S. Mead, and Arthur B. Turnure. A clubhouse is maintained in New York, and contains an excellent bibliographical library, a lecture and reading room, and many valuable pictures and prints. By exhibitions, lectures, and the issue of specially prepared books, perfection in the art of bookmaking is encouraged. The club has issued 60 publications since its formation, several having been bronze medallion plaques of Hawthorne, Lowell, Whittier, Poe, and Longfellow, and two etchings, "Grolier in the Printing House of Aldus" and a portrait of Franklin; among the books, an edition of the *Philobiblion* of Richard du Bury, and *Catalogues of Early and Original Editions from Langland to Wither; Bookbinding as a Fine Art*, by Robert Hoe; *Modern Book Binding*, by William Matthews; and *Historic Printing Types*, by T. L. De Vinne. An original, otherwise unpublished work is *Washington Irving*, by George William Curtis, a member of the club. Other original works written by members of the club and published by the club are *The Boston Post Bill*, by R. T. H. Halsey; *American Engravers upon Copper and Steel*, by David McN. Stauffer; *Notable Printers of Italy during the Fifteenth Century*, by Theodore L. De Vinne; *Bazilieogia a Booke of Kings*, by H. C. Levis, and *Bibliographical Notes on One Hundred Books Famous in English Literature*, compiled by Henry W. Kent. The club's literal reprint in the types of Wynkin de Norde of *The History of Helyas Knight of the Swan*, from the unique copy in the library of the late Robert Hoe; *Researches Concerning Jean Grolier*, by reason of its colored reproduction of bindings; *The Scarlet Letter*, by reason of its colored reproduction, by a new process, of water colors by Boughton, and *The Etched Works of Whistler*, by reason of its completeness, represent the utmost possibilities of bookmaking in their several spheres. See Plate of BOOKPLATES.

GROLIER DE SERVIÈRES, grȯ′lyȧ′ de

sâr′vyâr′, JEAN, VISCOUNT D'AGUISY (1479–1565). A French bibliophile, born in Lyons in 1479. He was the royal French representative in Italy for some time, mostly at Rome and Milan, where he cultivated his taste as a book lover. He was made Treasurer of Francis I in 1537, and was a noted collector of books valuable or curious for subject, material, workmanship, or binding. He was a master of the art of elegant bookbinding, and his volumes are highly prized by bibliophiles. They were usually in brown leather and in Renaissance patterns, with stripes and plant arabesques. His library, which numbered finally about 3000 volumes, was kept in his family until towards the last of the eighteenth century, when it was sold and scattered. At present only some 400 volumes are said to be known, the largest number being in the possession of the National Library in Paris. He died in Paris in 1565. There is to-day in New York City a club of book lovers named after him, the Grolier Club (q.v.). Consult Le Roux de Lincy, *Recherches sur Jean Grolier* (Paris, 1866), and Clément de Ris, *Les amateurs d'autrefois* (ib., 1876).

GROLL, ALBERT LOREY (1866–). An American painter, born in New York. He studied under Nicholas Gysis and Loefftz at Munich, and afterward devoted himself to landscape painting in various parts of America. At first he sought for color in the richly glazed effects much employed by his compatriots; later, however, he turned to painting in a higher key with cooler schemes of color. The change was coincident with his selection of the mesa lands of the Southwest as his subject. He likes the big expanse of blue sky, often with masses of rolling clouds, to be seen over the American deserts. Pictures of this type include; "No Man's Land" (Corcoran Gallery, Washington); "California Redwoods" (Brooklyn Institute); "Acoma Valley, New Mexico" (National Gallery, Washington). Groll was elected a member of the National Academy in 1910. He received awards at exhibitions in Munich, St. Louis, Philadelphia (Pennsylvania Academy), and New York (National Academy).

GROLMAN, grôl′mân, KARL WILHELM GEORG VON (1777–1843). A German soldier, born in Berlin. He entered the army at the age of 13. After serving on the Military Commission of 1807 which was appointed to reorganize the Prussian army, he left the Prussian service, which he did not reënter until 1813. He fought in the subsequent campaigns against Napoleon with the Austrian and Spanish armies, and at the battle of Waterloo was quartermaster-general on the staff of Blücher. He did much to promote the extension of German influence in the Province of Posen. His works include: *Geschichte des Feldzugs von 1814* (1842–43) and *Geschichte des Feldzugs von 1815 in den Niederlanden und Frankreich* (1837–38).

GROM′MET (OF. *gromet, grommet, gourmet,* apprentice, diminutive of *gromme, gourme,* from Icel. *grōm,* Eng. *groom,* man). A grommet is formed from a single strand of rope, which is laid up again to form a circle of three-stranded rope. The stiffener of whalebone or steel which is used to keep the rim of a sailor's flat blue cap in shape is called a grommet, as it was originally made of rope in that form. See KNOTTING AND SPLICING.

GROM′WELL (earlier *grommel, grummel,* from OF. *gremil,* Fr. *grémil,* grummel), *Lithospermum.* A genus of plants of the family Boraginaceæ. Extraordinary virtues were formerly ascribed to them, which, however, were wholly imaginary, particularly to the common gromwell (*Lithospermum officinale*), which was formerly used as a cure for stone in the bladder. The common gromwell is a native of dry, gravelly places in Europe, Asia, and North America. It has an erect, much-branched stem, broadly lanceolate leaves, and small flowers. There are about 40 species of Lithospermum, which occur throughout the temperate zones of the world. In the United States there are 8 or 10 species. Some have perennial roots that yield a red dye similar to alkanet.

GRONGAR (grŏn′gẽr) **HILL.** A descriptive poem by John Dyer (1727).

GRONINGEN, grō′nĭng-en. The northeastern province of Holland, bounded on the north by the North Sea, on the east by Germany and the Dollart, on the south by Drenthe, and on the west by Friesland. Area, 790 square miles (Map: Netherlands, E 1). Pop., 1899, 299,602; 1911, 333,217, including 20,305 Roman Catholics and 5686 Jews; 1912, 336,741. There is considerable shipping and industrial activity, but it is chiefly an agricultural province. The northern and northeastern districts produce wheat and oil seeds; the southern fen lands yield peat; potatoes, rye, and buckwheat are cultivated, and cattle are raised. The coastal fisheries are also important. The province was the ancient Cruoninga. Capital, Groningen.

GRONINGEN. The most important town in the north of the Netherlands, and capital of the province of the same name, situated at the confluence of the Hunse and the Aa, and at the convergence of a number of railway lines and canals, 22 miles west of the Dollart Inlet (Map: Netherlands, E 1). It is well built, is crossed by numerous canals, and is surrounded with promenades and walks laid out on the site of the old fortifications. The market place (Groote Markt) is one of the largest in Holland. The most prominent buildings are the Gothic church of St. Martin, surmounted by a tower 323 feet high; the town hall, built in 1810, and containing a collection of coins; the government buildings, the theatre, and the prison. The University of Groningen, founded in 1614, is composed of five faculties, with 52 professors, and has an attendance (1914) of 550. It occupies a fine group of buildings in the Dutch Renaissance style, erected after the fire of 1906 which destroyed the old university. Attached to it are a library of about 160,000 volumes, an observatory, a botanical garden, a museum of natural history, a hospital, and a number of laboratories. Among the other educational institutions of the town may be mentioned the Gymnasium, the academy of architecture and navigation, and the deaf and dumb asylum. In 1912 the state agricultural college was removed from Wageningen to Groningen. The town manufactures sugar, textiles, furniture, mirrors, gold and silver ware, cigars and tobacco, trimmed lumber, ships, machinery, etc. The harbor is accessible to seagoing vessels, and has considerable shipping. The trade of Groningen is chiefly in grain, rape seed, and animal products. Pop., 1899, 66,537; 1912, 78,276.

Groningen was granted by the Emperor Henry III in 1040, when it was known as Villa Cruoninga, to the Bishop of Utrecht. It was fortified in the thirteenth century, and joined the Hanseatic League as early as 1282. In 1594 the city was taken by Maurice of Nassau, and annexed to the United Netherlands. In 1672 the town withstood the attack of the Bishop of Münster.

GRONLUND, grŏn′lund, LAWRENCE (1847–99). An American Socialist, born in Denmark. He received the degree of master of arts in the University of Copenhagen in 1865, and two years afterward came to the United States. He was converted to Socialism by Pascal's *Pensées*, and gave up the practice of law to write and lecture on Socialism. His principal works are: *The Coming Revolution* (1880); the *Coöperative Commonwealth* (1884); *Ça Ira, or Danton in the French Revolution* (1888); *Our Destiny* (1890); *Insufficiency of Henry George's Theory* (1887); and *The New Economy* (1898). He published *Ça Ira* to prove that Danton had been misjudged. He considered the United States more advanced, and therefore better fitted for a socialistic régime, than any other country; that the only obstacle is the negro problem, but that social equality between the black and white races can and will be established. He wrote *Our Destiny* to prove that, instead of being necessarily associated with atheism, socialism would reveal to all the immortality of the soul.

GRON′NA, ASLE J. (1858–). An American legislator, born at Elkader, Clayton Co., Iowa, and educated in the public schools of Houston Co., Minn., and at Caledonia Academy. He moved to South Dakota in 1879 and subsequently to North Dakota, in which States he engaged in farming and banking. He served in the Territorial Legislature of North Dakota (1899), was chairman of the Republican Central Committee of Nelson County (1902–06), from 1905 to 1911 was a member of Congress, and was then elected United States Senator to fill the unexpired term (1911–15) of Martin N. Johnson. He was reëlected in 1914.

GRONO′VIUS. The Latinized name of two distinguished Dutch classical scholars of the seventeenth century. 1. JOHANN FRIEDRICH GRONOV (1611–71), born at Hamburg, Sept. 8, 1611. After study at various universities, supplemented by travel in France, Italy, and England, and study of manuscripts in those countries, he became professor of rhetoric and history at Deventer (1642), and then professor of Greek at Leyden (1658), and acquired an international reputation for profound learning. He was a prolific writer, publishing critical and annotated editions of Plautus, Terence, Cicero, Sallust, Livy, Seneca (father and son both), Statius, Tacitus, the elder Pliny, and Aulus Gellius; and edited the works of his friend Hugo Grotius (q.v.). All his work was in Latin, as his *De Iure Belli et Pacis Libri Tres* (Amsterdam, 1642). He died at Leyden, Dec. 28, 1671. 2. JACOBUS GRONOV (1645–1716), son of the preceding, born at Deventer, became a scholar of great renown. He traveled in England, France, and Italy, meeting the greatest classical scholars of those countries. At the invitation of the Grand Duke of Tuscany, he accepted the chair of law in the University of Pisa, but returned to Leyden in 1679 to fill the chair of Greek literature and history in that university. He brought out new editions of his father's works on Tacitus, Gellius, and the tragedies of Seneca, and in addition published annotated editions of Herodotus, the *Cebetis Tabula*, Polybius, Cicero, Minucius Felix, and Ammianus Marcellinus. But his greatest work was the *Thesaurus Antiquitatum Græcarum*, in 13 folio volumes, published at Leyden, 1698–1702. He engaged in many learned controversies with other scholars, in which his irascible temperament led him to personal abuse and scurrility. Notable were his sarcastic letters to Fabretti (q.v.), *Responsio ad Cavillationes Raphaelis Fabretti* (Leyden, 1685), and to Voss (q.v.), *Epistula de Argutiolis Isaci Vossii* (Leyden, 1687). He died at Leyden. Consult Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

GROOS, grōs, KARL (1861–). A German psychologist. He was born in Heidelberg, the son of a publisher, and was educated in the university there. He taught at Giessen (1889–98), Basel (1898–1901), and again at Giessen until 1911, when he became professor at Tübingen. His works, of particular importance in child psychology, especially in his study of play, and in æsthetics, which he relates less to metaphysics than to psychology, include: *Die reine Vernunftwissenschaft* (1889), *Einleitung in die Aesthetik* (1892), *Die Spiele der Tiere* (1896; 2d ed., 1907; English, 1898), *Die Spiele der Menschen* (1899; English, 1901), *Der ästhetische Genuss* (1902), *Das Seelenleben des Kindes* (1903; 4th ed., 1913), *Die Befreiung der Seele* (1909), *Der Lebenswert des Spieles* (1910). Consult Baldwin's preface to the English translations, *The Play of Animals* and *The Play of Man.*

GROOT, grōt, HOFSTEDE DE. See HOFSTEDE DE GROOT.

GROOT, HUIG DE. See GROTIUS.

GROOT, JAN JAKOB MARIA DE (1854–). A Dutch Orientalist, born in Schiedam. He was educated at Leyden, became a Chinese interpreter in the Dutch colonies, and succeeded Schlegel as professor of Chinese in Leyden, refusing a call to Columbia University. In 1911 he took the new chair of Chinese in Berlin. He wrote *The Religious System of China* (1892–1910) and, lectures at Hartford Theological Seminary, *Religion in China* (1913).

GROOTE, grō′te, **GROOT, GROETE**, GERHARD, called GERARDUS MAGNUS, "Gerard the Great" (1340–84). A mystic and preacher, the founder of the Brothers of the Common Life. He was born at Deventer, Holland, and educated at Paris, where he gained much learning. He became a teacher there and in various other places. He was not in holy orders, but held a number of benefices, living luxuriously until converted by a friend in 1374. He then gave up his benefices and, refusing any higher position than deacon, became a traveling and highly successful preacher (1379). He opposed the scholastics, advocated the reading of the Scriptures, and translated the Psalms into the common language. He gathered a company for the transcribing of books of the Bible, and enforced upon them the practice of community of goods. From this association arose the Brothers of the Common Life (q.v.). The order grew rapidly, and in spite of the opposition of the monastic orders, it was sanctioned by the Pope in 1418. He was influenced by the Carthusians, and later by the Augustinians, whose rule he gave to his order just before his death. Groote's own bishop was at first favorable to him, but the opposition of the clergy and of the civil authorities led to his being silenced in 1383. He died of the plague at Deventer, Aug. 20, 1384. He left numerous writings. His life was originally written by

Thomas à Kempis, who belonged to the Brothers of the Common Life. Consult the English translation by Arthur, *The Founders of the New Devotion* (St. Louis, 1905). Consult also Bonet-Maury (Paris, 1878).

GROS, grō, Antoine Jean, Baron (1771–1835). A French historical painter. He was born in Paris, March 16, 1771. Trained in correct drawing by his father, a miniature painter, at the age of 14 he came under the instruction of David. In 1793 he visited Italy, where he was associated through Josephine with Napoleon Bonaparte, who made him inspector of reviews, thus giving him the opportunity to acquire knowledge for the battle scenes he later executed, and appointed him one of the commissioners to select the works of art which Napoleon took from Italy. In 1796 Gros painted "Bonaparte at the Bridge of Arcole." His "Plague at Jaffa," exhibited in 1805 and purchased by the government, made him famous. Gros was always disposed to struggle against the romantic tendency which is more or less observable in his art, and endeavored to maintain the principles of the Classic school as practiced by David. In 1816 he was made member of the Institute and professor in the Ecole des Beaux-Arts, and in 1828 Officer of the Legion of Honor. For his painting in the cupola of the Pantheon, which represents the four chief dynasties of France offering their deeds as homage to St. Geneviève, he received in 1824 the title of Baron. Gros essayed in the last years of his life to return to the purely classical in his works "Hercules and Diomedes" and "Acis and Galatea," but the result compared so unfavorably with the examples of the Romantic school, then in the ascendancy, that the adverse criticism they evoked affected his mind, and he committed suicide in the Seine on June 27, 1835.

Gros's art represents the transition from the classic art of David to that of the Romantic school. He was the first to abandon classic subjects in favor of historical. To the drawing and composition of David's school he added excellence of color, depth of feeling, and vigor of action. His "Plague at Jaffa" (1805), now in the Louvre, is a masterpiece in this regard. It represents Napoleon ministering to his plague-stricken and dying soldiers in an Oriental courtyard. Other important works are: "Napoleon at Eylau" (1808, Louvre); "Napoleon before the Pyramids" (1810); the "Flight of Louis XVIII from the Tuileries" (1816) and others in the Museum at Versailles; and "Francis I and Charles V at St. Denis" (1808, Louvre), called by the painter his "Bouquet," the best of his works in color. His portraits, of which the Gallery of Versailles contains a large number, are powerful and characteristic. Among the best are those of Generals Masséna, Lasalle, and Fournier-Sarlovese (Versailles). His works in the classic style are the weakest of his productions. He left a large number of influential pupils.

Consult the biographies of Gros by Delestre (Paris, 1867), Tripier le Franc (ib., 1880), Dargenty (ib., 1887), and Lemonnier (ib., 1912); also Chesneau, *Les chefs d'école* (ib., 1883), and Delacroix, in the *Revue des Deux Mondes* (1848).

GROS, Pierre le. See Legros, Pierre.

GRO'SART, Alexander Balloch (1827–99). An English scholar and editor, born at Stirling, Scotland. Ordained as minister in the United Presbyterian church in 1856, he settled as pastor of St. George's Church, Blackburn, Lancashire, in 1868. Owing to ill health, he resigned in 1892, and passed his last years in Dublin. He wrote hymns and religious works, but is known chiefly for his editions of Elizabethan and post-Elizabethan writers, Spenser, Sidney, Nash, Greene, Barnfield, Donne, Giles Fletcher, Vaughan, Herbert, Herrick, and others, published in the Fuller Worthies' Library, the Chertsey Library, the Huth Library, and elsewhere. Grosart performed a valuable service in collecting a mass of literary material, which, however, needs sifting by more exact scholars.

GROSBEAK, grōs'bēk (from *gross* + *beak*, imitated from Fr. *grosbec*, grosbeak). Any of several birds, especially of the family Fringillidæ, notable because of the great thickness of the bill, which can be used for breaking the stones of cherries, olives, and the like. The hawfinch (q.v.) and greenfinch (q.v.) are common European examples. In America a number of birds, which have no close association with each other, are so called—prominently the cardinal. (See Cardinal Bird.) The pine grosbeak (*Pinicola enucleator*) breeds in the Far North, but in winter is found as far south as Washington, though its appearance is very irregular. As it usually appears, the color is slaty gray, with yellowish or reddish olive feathers on the crown and rump. In full plumage, however, the males are beautiful rosy red. The length is about 9 inches. The rose-breasted grosbeak (*Zamelodia ludoviciana*) is one of the handsomest birds of eastern North America. The male is black above and white below, with the breast a beautiful rose red; the female is grayish brown and buffy. The length is 8 inches. This grosbeak breeds as far north as Maine and Manitoba, but it winters in Central and South America. Its song is brilliant though not elaborate. In the Far West it is replaced by the black-headed grosbeak (*Zamelodia melanocephala*), the male of which has the breast orange brown instead of rose. (See Colored Plate of Eggs of Song Birds.) In the Southern States the blue grosbeak (*Guiraca cœrulea*) is a summer resident. The male is deep blue in color, and about 7 inches long. In the interior of North America from Manitoba northward is found the very handsome evening grosbeak (*Hesperiphona vespertina*), which is black, yellow, olive brown, and white. The length is about 8 inches. This grosbeak is irregularly migratory in winter, and in 1890 large flocks appeared in New England, where they were common for several weeks. It is usually a rare bird in any part of the United States except near Manitoba. It received its name under the impression that it sang only at twilight; but its voice is heard all day as it seeks its food (seeds, buds, and insects) in the forest trees. Three of the species above mentioned are illustrated on the Plate of Buntings, etc.

GROSCHEN. See Groat.

GROSE, grōz, Francis (c.1731–91). An English antiquarian writer, born in Middlesex of a Swiss father and an English mother. He began his career as an architectural draftsman, but his improvident habits made it necessary for him to combine this with other occupations, and he is known principally by his antiquarian researches. Grose's voluminous writings include general discourses upon the antiquities of England and Wales, Scotland, and Ireland, and special articles, upon armor, for example, while his humor is shown in parodies, dictionaries of slang, and proverbs. His works include: *Antiquities of England and Wales* (1773–87); *Antiquities of Scotland; Classical Dictionary of the Vulgar Tongue* (1785; reissued, 1811, as *Lexicon Balatronicum*).

GROSE, George Richmond (1869–). An American Methodist Episcopal clergyman and university president, born in Nicholas Co., W. Va. He graduated from Ohio Wesleyan University in 1894, and from the Boston University School of Theology in 1896. Ordained to the ministry in 1896, he was pastor of churches in Massachusetts, at Leicester (1894–99), Jamaica Plain, Boston (1897–1900), Newton (1900–05), and Lynn (1905–08), and of Grace Church, Baltimore (1908–13). He lectured at Johns Hopkins University in 1910–13. In 1913 he accepted the presidency of De Pauw University. Besides his articles in church magazines he is author of *The Outlook for Religion* (1913).

GROSE, William (1812–1900). An American soldier and politician, born in Dayton, Ohio. When he was three years old his family removed to Indiana. He received a common-school education, studied law, and in 1852 was a presidential elector on the Pierce ticket and a candidate for Congress. When the Republican party was organized soon afterward he joined it, and in 1856 was elected to the Legislature. In 1860 he was elected a judge of the Court of Common Pleas, but resigned to recruit the Thirty-sixth Indiana Infantry, of which he was colonel. He commanded a brigade in the battles of Murfreesboro, Chickamauga, and Chattanooga, and was commissioned a brigadier general on July 30, 1864. In 1865 he was brevetted major general of volunteers. From 1866 to 1874 he was collector of internal revenue for the fifth district in Indiana; in 1877 he was sent to the Legislature for the second time; and from 1879 to 1883 was a State Senator. He again ran for Congress in 1878, on the Republican ticket, but was again defeated. From 1884 to 1886 he was one of a commission appointed to build three State hospitals for the insane, and in 1887 was once more elected to the Indiana Legislature.

GROSS, grōs (OF. *gros*, from Lat. *grossus*, thick). In law, at large; general; not limited or confined to a particular thing. Thus a right *in gross* is a right generally exercisable by a person, as distinguished from a right *appendant* or *appurtenant* to his land. The term is most commonly employed in connection with the class of rights known as incorporeal hereditaments, as easements and profits *à prendre* in the lands of another. Thus, a right to take ice from a neighbor's pond to supply the domestic uses of the taker is a profit appurtenant to the premises of the latter, whereas a right to take ice *ad libitum* for any purpose is a profit in gross. Such a profit is a true real property right, which may be acquired by grant (q.v.) or prescription (q.v.), and which, when once gained, may be alienated or transmitted, like other real property, to the heir of the owner. Corresponding rights in the nature of easements, sometimes called easements in gross, as a personal right of way over another's land, are, on the other hand, not recognized as property rights at common law, but only as licenses. In the United States, however, certain rights of this sort, as a right to take water from the grantee's land, or to post bills on his premises, though easements and not appurtenant to any land of the grantee, have been recognized as property rights and, as such, alienable and inheritable like profits in gross. See Appurtenance; Easement; License; Profit à Prendre.

GROSS, grōs, Charles (1857–1909). An American historian, born at Troy, N. Y. He graduated at Williams College in 1878, went abroad for historical study, and took his doctorate at Göttingen in 1883. From 1884 to 1888 he continued his historical work in England, confining himself to researches in the constitutional history of that country. He returned to the United States in 1888 to become instructor in history at Harvard University, where in 1901 he became a full professor. His researches in constitutional history, which made him probably better known in Europe, and especially in England, than in America, include: *Gilda Mercatoria* (1883); *The Exchequer of the Jews of England in the Middle Ages* (1887); *The Gild Merchant* (1890); *Select Cases from the Coroner's Rolls* (1896); *Bibliography of British Municipal History* (1897); *Sources and Literature of English History* (1900); *The Court of Picpowder* (1906).

GROSS, grôs, Ferdinand (1849–1900). An Austrian author, born and educated at Vienna. He was an editor of the *Frankfurter Zeitung* (1879–81); of the *Wiener Allgemeine Zeitung* (1881–86); of the *Wiener Frendenblatt;* and of the publication entitled *Wiener Mode,* which he conducted for several years. His works consist mostly of collections of short sketches and studies in the *feuilleton* style, of which may be mentioned: *Kleine Münze* (1878); *Oberammergau Passionsbriefe* (1880); *Nichtig und Flüchtig* (1880); *Mit dem Bleistift* (1881); *Aus der Bücherei* (1883); *Blätter im Winde* (1884); *Litterarische Modelle* (1887); *Goethes Werther in Frankreich* (1888); *In Lachen und Lächeln* (1898); *Von der leichten Seite* (1900). In his collections of verses he shows the same light, graceful humor. Of his dramas the best are the comedies *Die neuen Journalisten* (1880), in collaboration with Max Nordau, and *Der erste Brief* (1883).

GROSS, grōs, Samuel D. (1805–84). A celebrated American surgeon, born in Pennsylvania. Graduating from Jefferson Medical College, Philadelphia, in 1828, he practiced his profession in Philadelphia from 1828 to 1833, and in Cincinnati, Ohio, from 1833 to 1840. From 1835 to 1840 he was also professor of pathological anatomy in Cincinnati College. He was professor of surgery in the University of Louisville, Ky., from 1840 to 1850; professor of surgery in the University of New York from 1850 to 1856; and professor of surgery in Jefferson Medical College from 1856 to 1884. He was president of the American Medical Association in 1868, and of the American Surgical Association in 1880. Oxford, Cambridge, and Edinburgh conferred on him honorary degrees. His contributions to literature, besides valuable translations of French and German works, included: *Diseases of the Bones and Joints* (1830); *Elements of Pathological Anatomy* (1839); *System of Surgery* (6th ed., 1884).

GROSS, William Hickley (1837–98). An American Roman Catholic prelate, born in Baltimore, Md. He studied at St. Joseph's College and joined the Redemptionists in 1857, becoming superior of the order in 1871. Two years later he was appointed Bishop of Savannah, Ga., and in 1884 became Archbishop of Oregon.

GROSS ADVENTURE. In maritime law, a bottomry loan, so called because of the general character of the risk assumed. Such a loan contributes to the general average in case of loss. See BOTTOMRY BOND; AVERAGE, IN LAW.

GROSSBEEREN, grōs-bā'ren. A village in the District of Potsdam, Germany, 13 miles south of Berlin. It is noted as the site of the battle in which the allies defeated the French in their advance on Berlin, Aug. 23, 1813.

GROSSCUP, grōs'kŭp, PETER STENGER (1852–). An American jurist, born at Ashland, Ohio. Graduating from Wittenberg College in 1872 and from Boston University Law School in 1874, he practiced law in his native town, and was city solicitor for six years. In 1882 he removed to Chicago, where he practiced with great success until 1892, then being appointed United States district judge for the northern district of Illinois. It was while serving in this office that he issued the injunction against Eugene V. Debs and other officers of the American Railway Union during the strikes of 1894. From 1899 to 1911 he was a member of the United States Circuit Court of Appeals. In 1908, as one of three members of this court, he wrote the opinion reversing the Landis decision which had fined the Standard Oil Company $29,240,000. President Roosevelt characterized the reversal as "a gross miscarriage of justice," and in general the decision aroused much criticism. In 1911 he resigned his judicial office and resumed the practice of law in Chicago.

GROSSE, grō'se, JULIUS (1828–1902). A German poet, born at Erfurt and educated at Halle. He studied law, then painting, then turned to poetry, finally succeeded better as a journalist, spending, however, many years as general secretary of the Schiller Foundation. Grosse wrote too rapidly and too much to produce many things that will last, but his best work was done in his *Novellen* and his lyrics. Among his numerous works may be mentioned various editions of lyrics: *Tiberius*, a drama (1875); *Das Mädchen von Capri* (1860) and *Gundel vom Königssee* (1864), both tales in verse; *Das Volkramslied: Ein Sang aus unseren Tagen* (1890), an epic; *Novellen* (3 vols., 1862–63), short stories; *Maria Mancini* (1871), a novel; *Ursachen und Wirkungen: Lebenserinnerungen* (1896), a biographical work.

GROSSE, THEODOR (1829–91). A German historical painter. He was born at Dresden and studied at the Dresden Academy under Bendemann. For his encaustic decorations in the castle of Count Solms Wildenfels on the Mulde, he was awarded the traveling scholarship of the Dresden Academy. After several years in Italy Grosse returned to fresco the eastern loggia of the Leipzig Museum. In 1867 he was made professor at the Dresden Academy. His other works include: "Leda with the Swan" (1852, Dresden Gallery); "Scenes from the Myth of Bacchus" (1877, foyer of the New Theatre, Dresden); "The Visit of the Three Angels to Abraham" (1863, Museum, Leipzig); "Arrival of the Souls in Purgatory," after Dante (1879, Dresden Gallery).

GROSSE (grōs) **ISLE.** An islet of Canada, in the river St. Lawrence, 2½ miles long and 1 mile wide. It lies 29 miles below Quebec and is the provincial quarantine station.

GROSSENHAIN, grō'sen-hīn. A town in the Kingdom of Saxony, Germany, on the Röder, 20 miles northwest of Dresden (Map: Germany, E 3). It has a gymnasium, trade and agricultural school, public library, and park. Its extensive manufactures include woolens, silk, machinery, buckskin, leather, cigars, hosiery, safes, fertilizer, cut glass, print goods, copper and zinc wares, soap, lumber, and bricks. The state gardening industry has a rose nursery here. Pop., 1900, 12,064; 1910, 12,217. The town is mentioned as early as the tenth century.

GROSSETESTE, grōs'tĕst, ROBERT (c.1175–1253). A celebrated English prelate. He was born in Suffolk, studied at Oxford and Paris, and, after returning to England, gained great reputation as a divine. He was the first rector of the Franciscan school at Oxford (1224). In 1235 he was elected Bishop of Lincoln and set himself in most vigorous fashion to reform all abuses in his diocese. He was a man of great energy and strong character, but high-tempered and undiplomatic, and became involved in numerous controversies. One of the most famous was with no less a personage than Pope Innocent IV himself. It was not unusual at the time for the Pope to appoint foreigners to vacant benefices in England, many of whom drew their revenues, but never came to the country. Grosseteste set himself against this abuse, and in 1253 refused to induct the Pope's nephew, an Italian youth, into the first canonry that should be vacant in the cathedral of Lincoln. He died Oct. 9, 1253. Grosseteste was a friend of Simon de Montfort (q.v.) and a constitutionalist in politics. His learning was prodigious. Latin, Greek, Hebrew, French, mathematics, medicine, and music were among his attainments, and his knowledge of Scripture is particularly lauded. His influence on English life and thought lasted long beyond his time. He was a most voluminous writer. For his life, consult: Pegge (London, 1793), which contains a list of his works filling 28 closely printed quarto pages; Brewer, *Monumenta Franciscana*, vol. i (ib., 1858); Luard (ed.), *Roberti Grosseteste Episcopi quondam Lincolniensis Epistolæ*, "Rolls Series" (1862); Stevenson (ib., 1899). For his connection with Oxford, consult Rashdall, *Universities of Europe during the Middle Ages* (Oxford, 1895).

GROSSETO, grōs-sā'tō. An episcopal town, capital of the province of the same name, in Tuscany, Italy, 90 miles south-southeast of Pisa. The cathedral, begun in 1294, was restored in 1855. In the Municipio is a collection of Etruscan antiquities (Map: Italy, C 3). The cathedral is built, in the Italian Gothic style, of alternate courses of red and white marble. A few miles to the northeast are the ruins of Rusellæ, one of the 12 cities of the Etruscan Confederation. Grosseto markets cattle, horses, lumber, and grain, and manufactures agricultural machinery. Pop. (commune), 1901, 9599; 1911, 12,442.

GROSSGLOCKNER, grōs'glŏk'ner. See GLOCKNER.

GROSSGLOGAU, -glō'gou. See **GLOGAU.**

GROSSI, LUDOVICO. See VIADANA.

GROSSI, grōs'sē, TOMMASO (1791–1853). An Italian poet and novelist, born at Bellano. He studied law at Pavia, but, owing to his political ideas, never rose in his profession. His heroic poem "I Lombardi alla prima crociata" (1826), in imitation of Tasso, attracted much attention because of its patriotic sentiment. He dedicated the historical novel *Marco Visconti* (1834) to Manzoni, who had given him encouragement. He has been translated often and is still popular. His other works in addition to his important dialect verses include *Ildegonda* (1814) and *Ulrico e Lida* (1837), which renewed the popularity of the novel in verse—their sentimentality infecting many writers of the period; *Opere* (Milan, 1862); *Opere poetiche* (ib., 1877). Consult Cantù, *Vita ed opere di Tommaso Grossi* (Milan, 1854), and Vicari, *Dell' opera poetica di T. Grossi* (Cagliari, 1901).

GROSS KIKINDA, grōs kĭk′in-dȧ. See Nagy-Kikinda.

GROSSMITH, grōs′smĭth, George (1847–1912). An English actor, son of a journalist of the same name. In 1866 he became a reporter for the London *Times*, but soon turned to the stage and about 1870 began his career as an entertainer with comic songs and the like. In 1877 he appeared in *The Sorcerer* at the Opera Comique and became very popular in other Gilbert and Sullivan operas, his best-known part being that of the Admiral in *Pinafore*. Two years later he again set up as an individual entertainer and visited all the chief cities of Great Britain and the United States. He retired from the stage in 1901. Among his writings are: *The Reminiscences of a Society Clown* (London, 1888); *The Diary of a Nobody*, written with Weedon Grossmith (ib., 1894), and numerous songs.

His brother, Weedon Grossmith, the artist, became well known also as an actor, and his son George (1874–) gained some note as an actor and playwright.

GROSSULARITE, grŏs′ū-lar-īt. See Garnet.

GROSSWARDEIN, grōs′vär-dīn′. See Nagy-Várad.

GROSVENOR, grō′ve-nẽr, Edwin Augustus (1845–). An American historian, born in Newburyport, Mass. He graduated at Amherst in 1867 and at Andover Theological Seminary in 1872, after which he took a year of post-graduate work in Paris. He was professor of history in Robert College, Constantinople, in 1873–90; professor of European history at Amherst in 1892–98, of modern government in 1898–1901, and of modern government and international law after 1901. In 1892–94 he was professor of history at Smith College also. He received the Amherst Litt.D. in 1914. His writings include, in addition to much work done for reviews and encyclopædias: *Constantinople* (2 vols., 1895); *The Permanence of the Greek Type* (1897); *The Hippodrome of Constantinople and its Still Existing Monuments* (1889); *Contemporary History of the World* (1898–99). In addition he translated from the French and revised Duruy's *History of Modern Times, General History of the World* (1898), and *Ancient History of the East* (1898–99), and from the modern Greek, *Andronike* (1897).

GROSVENOR, Gilbert Hovey (1875–). An American geographer. Born in Constantinople, Turkey, he was educated there in the preparatory department of Robert College, and in the United States at the Worcester (Mass.) Academy and at Amherst College (A.B., 1897; A.M., 1901). He taught for a year and after 1899 was connected with the *National Geographic Magazine*, as assistant editor, managing editor, and, after 1903, as editor. In 1909 he became a director of the National Geographic Society. He was associate editor of the *Proceedings of the Eighth International Geographic Congress* (1905) and of the *Scientific Report of the Zeigler Polar Expedition of 1905–06*, and edited *Scenes from Every Land* (1907; 3d ed., 1912). He became a regular contributor to the *Century, The Chautauquan*, and the *Popular Science Monthly*, and wrote *The Explorations of the Nineteenth Century*, in the reports of the Smithsonian Institution (1910).

GROSVENOR, H. L. See Westminster, Duke of.

GROSVENOR GALLERY. A gallery for the exhibition of paintings and sculptures in Bond Street, London. The building was completed in 1877, at a total cost of £120,000. The façade is of stone in the Italian Renaissance manner, and the principal gallery is 104 feet long by 35 feet wide and 36 feet high. The institution was founded by Sir Lindsay Coutts for the purpose of giving unofficial exhibitions of art, under conditions quite different from those usually employed. A jury of selection was dispensed with, and artists of reputation were invited to send any or as many of their works as they desired. The interior of the galleries was so decorated and the pictures so arranged that they might be seen under conditions which prevail in private houses. Many Royal Academicians contributed to these exhibitions, but the method of invitation and selection has attracted to them artists who are at variance with the Academy, with the result that they represent a newer and less conventional character of English art. The exhibition begins May 1st, and is one of the events of the London season.

GROSVENOR HOUSE. The city residence of the Duke of Westminster, on Upper Grosvenor Street, London; formerly Gloucester House, built for the Duke of Gloucester, brother of George III. It contains a famous private collection of paintings.

GROSVENOR SQUARE. A square in London, east of Hyde Park, noted for its literary and aristocratic associations. Bulwer Lytton spent his later years at No. 12, and Chesterfield House is on South Audley Street, which runs out from the Square. It was laid out in 1716.

GROS VENTRES, grô′ väɴ′tr′ (Fr., great bellies). A name applied by French traders to two distinct tribes, the Minitari or Hidatsa, on the Missouri, and the Atsina, an offshoot of the Arapaho. At present the name is applied to the latter, but often qualified as Gros Ventres of the Prairie. See Minitari.

GROT, grŏt, Nikolai Yakovlevitch (1852–98). A Russian philosopher, born and educated at St. Petersburg. He successively occupied the chairs of philosophy at Niezhin (1876–83), Odessa (1883–86), and Moscow (after 1886). In his numerous works (written chiefly in Russian) he endeavors to evolve a philosophical system in which the will becomes a primary agent, dominating the external world. In 1894–96 he was editor of the periodical *Voprosy Filosofii* (philosophical questions), the first philosophical publication of its kind in Russia. His works in French include: *Nouvelle classification des sentiments* (1878) and *La causalité et la conservation de l'énergie* (1890). His more important publications in Russian are: *Dreams as a Subject for Scientific Analysis* (1878); *Psychology of the Feelings* (1880); *Philosophy as Art* (1880); *A Criticism on the Conception of Free Will* (1889); *The Mission* of *Psychology* (1890); *Turning Points in the Development of the New Philosophy* (1894).

GROT, grōt, Yakov Karlovitch (1812–93). A Russian philologist, born at St. Petersburg and educated at Tsarskoye Selo. He held a professorship in Russian history and literature at Helsingfors from 1841 to 1853, and was then appointed to the same position at the Alexander Lyceum at St. Petersburg, where he also was private tutor to the Grand Duke Alexander, afterward Czar Alexander III. His principal works are: the very important *Filologičeskya razyskanya* (Philological Investigations, 3d ed., 12 vols., 1885); a critical edition of the work of Derzhavin (9 vols., 1864–80); *The Correspondence of Catharine II with Grimm* (1884); a revised edition of the Russian lexicon of the Academy of St. Petersburg (first 2 vols., 1891–92).

GROTE, George (1794–1871). An English historian of Greece, born in Kent, Nov. 17, 1794. At the age of 16, after acquiring an elementary education in Latin and Greek, he entered the bank in which his father was a partner. He not only continued his classical studies, however, but delved into history, philosophy, and political economy. He sided with the liberal school of thought, to which his creative mind made important contributions. After the passage of the Reform Bill of 1832, in favor of which he had zealously written and spoken, he entered the House of Commons as a representative of London. In the beginning of his public career he commanded a large following, but in time his advanced democratic ideas alienated all supporters with the exception of a few "philosophic radicals." He retired from Parliament in 1841, and two years later from the banking business, to give all his attention to study and writing. Before entering public life he had published (*Westminster Review*, April, 1826) a scathing criticism of Mitford's *History of Greece*, a work from an extreme Tory point of view. It was partly to right the wrong done by Mitford to the spirit of free institutions, and partly to teach his countrymen a lesson in democracy, that Grote conceived and wrote his magnificent *History of Greece*. As early as 1822 he had begun planning the work, but his duties as statesman and banker compelled him to defer it till his retirement into private life. The first two volumes appeared in 1846, the twelfth and last in 1856. The work is pervaded by an intense enthusiasm for Greek democracy, which sometimes leads the author to underrate other forms of government; at the same time it aims to present all the known facts, that the reader may be able to form his own judgment. In 1865 he completed in three volumes a work on *Plato and the Other Companions of Socrates*. A thorough realist, the author could not fully appreciate the idealism of Plato, and yet these volumes have a value in presenting certain aspects of Platonic thought which down to his time had passed unnoticed. Grote began a similar treatise on Aristotle, but did not live to complete it. Meantime he was taking an active interest in education. He was president of University College, vice-chancellor of the University of London—two great nonsectarian institutions—and a trustee of the British Museum. He died June 18, 1871. Consult: Mrs. Grote, *Personal Life of George Grote* (London, 1873); his *Minor Works, with Critical Remarks on his Intellectual Character, Writings, and Speeches*, ed. by Alexander Bain (ib., 1873); his *Aristotle*, also ed. by Bain (ib., 1872).

GROTEFEND, grō′te-fĕnt, Georg Friedrich (1775–1853). A German Orientalist and classical scholar, born at Münden and educated at Göttingen. From 1797 to 1821 he was successively prorector and conrector of the Gymnasium at Frankfort, whence he was called to become director of the lyceum at Hanover, which position he held until 1849, when he retired from active life. As a scholar Grotefend was broad, but was prevented by this very quality from becoming a strictly methodical investigator. His first important work was *Anfangsgründe der deutschen Poesie* (1815), which was followed by a revision of Wenck's *Lateinische Grammatik* (2 vols., 1823–24). His contributions to the Old Italic dialects are of considerable importance. They comprise: *Rudimenta Linguæ Umbricæ* (1835–38); *Rudimenta Linguæ Oscæ* (1839); *Geographie und Geschichte von Altitalien* (1840–42). Grotefend's chief importance, however, lies in his contribution to the decipherment of Old Persian inscriptions. (See Cuneiform Inscriptions.) He held that there were in all three systems of cuneiform writing in the Persian inscriptions, that the Persian characters were alphabetic, that there were 40 letters in all in the alphabet, and that the inscriptions must be read from left to right. He increased the number of certainly known characters from three to 11, and approximated the real value of several more. He published his first study in this subject in 1800, and produced his chief work on it in 1837, *Neue Beiträge zur Erläuterung der persepolitanischen Keilschrift*. In addition to his other studies, he was one of the first to turn his attention to the difficult problem of the interpretation of the Lycian inscriptions.

GROTESQUE, grō-tĕsk′ (Fr., from It. *grottesco*, grotesque, from *grottesca*, style of painting found in ancient crypts, from *grotta*, cavern, from ML. *grupta*, *crupta*, from Lat. *crypta*, crypt). A style of classical ornament, so called in the thirteenth century from its having been rediscovered in the excavations made in the baths of Titus and other ancient Roman buildings. This light, fantastic style was much in favor during the Renaissance. It abounds in all kinds of transformations, from the animal to the vegetable, and mingles all the natural kingdoms in the most fanciful and picturesque confusion. The name "grotesque" thus came by degrees to mean a fanciful combination of natural ideas as applied to ornament.

GROTH, grōt, Klaus (1819–99). A German poet, and the first writer of prominence to employ "Plattdeutsch," or Low German, as a literary medium. He was born at Heide, in Ditmarsh, the western part of Holstein, Prussia. He studied at the normal school in Tondern and then secured a position as a teacher of girls in his native place, devoting his spare time to the study of philosophy, mathematics, and the natural sciences. Finally, his health giving way, he retired to the island of Fehmarn, in the Baltic, where he remained five years, and where most of his poems were written. In 1853 he went to Kiel, then traveled through Germany and Switzerland on a pension from the King of Denmark, and after a two years' sojourn at Bonn, where he received the doctor's degree in recognition of his services to the Low

German as a literary language, took up his residence in Dresden. In 1857 he returned to Kiel, where the university made him an instructor in German language and literature, then in 1866 professor, which position he held until his death. His fame rests chiefly on his *Quickborn* (1852; 25th ed., 1900), a collection of poems in the Ditmarsh dialect (also translated into High German by Hoffmann in 1856). Besides *Quickborn,* his principal works are: *Vertelln* (2 vols., 1855–59), prose tales from the peasant life of his home; *Hundert Blätter* (1854), High German poems; *Ut min Jungsparadies* (1876), tales in Low German. His works have been collected and published in four volumes (Kiel, 1898). For an estimate of his works, consult Eggers, *Klaus Groth und die plattdeutsche Dichtung* (Berlin, 1885), and Siercks, *Klaus Groth, sein Leben und seine Werke* (Kiel, 1899).

GROTH, PAUL VON (1843–). A German mineralogist. He was born at Magdeburg and was educated at the Freiberg Mining School and at Berlin. After lecturing at the former institution and at the University of Berlin, he became professor of mineralogy at Strassburg in 1872 and in 1883 at Munich, where he was appointed custodian of the royal mineralogical collections. In 1877 he founded at Leipzig the important periodical *Zeitschrift für Krystallographie und Mineralogie.* A prolific writer on subjects connected with crystallography, in which he came to be recognized as a foremost authority, he received a title of nobility from the Bavarian government and received many honors from foreign universities and societies. His writings, chiefly on mineralogy and crystallography, include: *Tabellarische Uebersicht der Mineralien nach ihren krystallographisch-chemischen Beziehungen geordnet* (new ed., 1898); *Physikalische Krystallographie* (3d ed., 1895); *Grundriss der Edelsteinkunde* (1887); *Chemische Krystallographie* (1906); *The Optical Properties of Crystals* (trans. by B. H. Jackson, 1910).

GROTIUS, grō′shĭ-ŭs, HUGO, or DE GROOT (1583–1645). A distinguished Dutch publicist and scholar, born at Delft, April 10, 1583. His father, Jan de Groot, was burgomaster of the town and also curator of the University of Leyden. In his eleventh year Hugo entered the University of Leyden, where he studied under Joseph Scaliger, the renowned classical scholar. In his fifteenth year he took his degree. In the following year he accompanied Olden Barneveldt, the Grand Pensionary, on his embassy to France, where Grotius' talents and conduct gained the favor of Henry IV. On his return he began practice as a lawyer and conducted his first case at the bar of The Hague in 1599. In 1607 he was appointed fiscal general, and in 1613 council pensionary, at Rotterdam. The disputes between the two embittered factions into which the dominant Calvinistic party was divided—the Remonstrants (or Arminians) and the Contraremonstrants (the more orthodox party)—were now at their height in Holland; Olden Barneveldt was the protector of the former, and Grotius actively supported them by his writings and by direct political action. These theological strifes had a dire political significance, and in the end both Olden Barneveldt and Grotius were arrested, tried, and condemned by the dominant party under Prince Maurice. (See BARNEVELDT.) Olden Barneveldt was beheaded in 1619, and Grotius sentenced to imprisonment for life in the castle of Loevenstein. He escaped, however, by the contrivance of his wife.

For some time Grotius wandered about in destitute circumstances in the Catholic portions of the Netherlands and finally escaped to France. Here his straitened circumstances continued in spite of the fact that Louis XIII bestowed upon him a pension of 3000 livres, since but a part of it was paid, and in 1631 it was withdrawn. A friendly letter from Prince Frederick of Orange induced him to return to his native country; but, by the intrigues of his enemies, sentence of perpetual exile was soon passed upon him. He removed to Hamburg, and while there he received invitations from the kings of Denmark, Poland, and Spain; but the protection promised him by the Chancellor Oxenstiern, and Queen Christina's taste for literature, induced him to enter the Swedish service in 1634. He held the position of Ambassador at the French court (1635–45). His reception by the Queen on his return to Sweden was flattering; but the literary dilettantism of Christina's court did not suit so serious and solid a scholar. Besides, the climate of Sweden did not agree with him, and he was anxious to spend the evening of his life in his native land. In consequence, he sent in his resignation of office to the Queen, who, when she found that nothing could induce him to stay, presented him with a sum of 10.000 crowns and some costly plate, besides placing at his disposal a vessel to conduct him down the Baltic to Lübeck. A storm compelled him to land on the coast of Pomerania. While proceeding towards Lübeck, he fell sick, and died at Rostock, Aug. 28, 1645.

To the talents of a statesman Grotius united deep and extensive learning in various fields of knowledge. He was a profound and enlightened theologian, a brilliant scholar, an acute thinker, and a jurist of rare insight and breadth of vision. His metrical translations from the Greek authors also display superior poetical powers; he was one of the best modern writers of Latin verse and likewise composed poems in Dutch. (See ANTHOLOGY, *Greek.*) In spite of his wandering and checkered career Grotius found time to write a great variety of works, which in themselves would have given him a permanent place in history. The first was the *Mare Liberum,* in which he defended the freedom of the Dutch East India trade and specifically combated the English assumption to the control of the North Sea. His chief work, however, is that entitled *De Jure Belli et Pacis,* which has been translated into all the principal languages of Europe. It may be considered as the basis of international law and has been much used as a textbook on the subject. Among his other works we may mention *Annales et Historiæ de Rebus Belgicis* (Amsterdam, 1657), written in a style that rivals Tacitus for concise and pointed power; *Annotationes in Vetus Testamentum* (Paris, 1644); *De Satisfactione Christi;* and *De Veritate Religionis Christianæ* (Leyden, 1627), remarkable for its clear arrangement, vigorous logic, and eloquent style. Consult: Butler, *Life of Grotius* (London, 1826); De Vries, *Huig de Groot en Maria van Reigersbergen* (Amsterdam, 1827); Creuzer, *Luther und Hugo Grotius* (Heidelberg, 1846); H. Bertens, *Hugo de Groot en zijn rechtsphilosophie* (Tilburg, 1905); A. D. White, *Seven Great Statesmen in the Warfare of Humanity with Unreason* (New York, 1910).

GROTON, grôt′*on*. A town in New London Co., Conn., on the Thames River, opposite New London, and on the New York, New Haven, and Hartford Railroad, and on the Chelsea Steamship Line (Map: Connecticut, G 4). It contains the Bill Memorial Library, and has large shipbuilding yards. The government is administered by annual town meetings. The town owns the water works, electric-light plant, and sewer system. Pop., 1900, 5962; 1910, 6495.

Here occurred, on Sept. 6, 1781, what has been called the Massacre of Fort Griswold. One hundred and fifty Americans stubbornly resisted an attack of about 800 Tories under Benedict Arnold, who finally forced their way into the fort and, maddened by the prolonged resistance, butchered the greater part of the survivors after their surrender. Of the 150, 85 were killed and 65 wounded, 35 mortally. The site has been made a state reservation, which contains a monument in commemoration. Consult: *History of New London County* (Philadelphia, 1882) and an article "The Massacre of Fort Griswold," in *Magazine of American History*, vol. vii (New York, 1880); C. F. Burgess, *Historic Groton* (Moosup, Conn., 1909).

GROTTAGLIE, grŏt-tä′lyȧ. A city in the Province of Lecce, Italy, 12 miles northeast of Taranto (Map: Italy, F 4). It has chalk and clay quarries, apiaries, manufactures pottery and leather goods, and markets grain, fruit, wine, oil, cotton, and cattle. Pop. (commune), 1901, 11,274; 1911, 11,851.

GROTTE, grŏt′tȧ. A town in the Province of Girgenti, Sicily, 13 miles northeast of the city of Girgenti. Sulphur mining is the principal industry. Pop. (commune), 1901, 11,039; 1911, 10,148.

GROTTGER, grŏt′gẽr, Arthur von (1837–67). A Polish historical painter and draftsman. He was born at Ottyniovitz (Galicia), studied at Lemberg and Cracow and in the academy schools at Vienna, chiefly under Karl Blaas. While in Vienna he began to make his reputation with a cycle of crayon drawings of the Polish revolution. About 1865 he went to Italy, and a year afterward to Paris, where he executed his cycle of 12 cartoons, "In the Valley of Tears," exhibited at the Exposition of 1867 and later bought by the Emperor of Austria. His "Warsaw" (seven scenes, 1861), "Poland" (nine scenes, 1863), "Lithuania" (six scenes, 1863), present a history of Poland intensely patriotic and profoundly sad. Grottger is rather a draftsman than a painter; all his work is good in composition. He is represented in the museums of Cracow and Geneva. Consult his biography by Aren (Vienna, 1878) and Kantecky (Lemberg, 1879).

GROTTO OF THE SIBYL. See Sibyl, Grotto of the.

GROUCHY, grōō′shē′, Emmanuel, Marquis de (1766–1847). A French marshal. He was born at Vallette in the Department of Seine-et-Oise, Sept. 5, 1766. He entered the French army at the age of 14 and by 1789 had risen to the rank of captain in the royal bodyguards. In spite of birth and training he threw in his lot with the Republicans and left the royal guard for a line regiment. In 1792 he was a colonel of chasseurs and camp marshal. His services in Savoy and in La Vendée (1793) were rewarded with the rank of brigadier general (1794); but the decree of the Convention against the nobles forced his retirement for a time. He was reinstated in command in 1795 and took part, as second in command to Hoche, in the Irish expedition (1796) and entered Bantry Bay. In 1798 he fought under Joubert in Italy and later distinguished himself under Moreau in Piedmont. His public protest against the coup d'état of the 18th Brumaire did not prevent Napoleon from utilizing his services, and he took part in the campaign on the Danube, distinguishing himself at Hohenlinden (1800). After the Peace of Lunéville Grouchy was made inspector general of cavalry and employed on various important missions, becoming one of Napoleon's most trusted followers. During the Russian expedition he commanded a cavalry division at Borodino and in the retreat led the "sacred squadron" of officers forming the Imperial bodyguard. Nevertheless, he was refused the command of an army corps in 1813, but at the close of the year accepted a lesser post, and, after fighting bravely against odds, was severely wounded at the battle of Craonne (1814). The Bourbon restoration resulted in Grouchy's loss of rank and banishment, and on Napoleon's return from Elba Grouchy was one of the first to offer his services. He suppressed the Royalists under the Duke of Angoulême and received a marshal's baton as his reward. He received command of a division of the French army sent against Wellington and Blücher. With a force of 35,000 men and 100 guns, he was ordered to operate against Blücher and the Prussians after their defeat at Ligny. These orders he obeyed too literally, for, in spite of the entreaties of his generals, he remained before Wavre, assailing Blücher's rear guard of 15,000 men, while the rest of the Prussian army marched to the field of Waterloo. The absence of Grouchy's army resulted in Napoleon's defeat and caused the Emperor to exclaim: "I should have gained the day but for his stupidity." Grouchy did all he could to repair his fatal error; but the cause of the Empire was lost, and he resigned his command under the walls of Paris. Under the Second Restoration he was proscribed, and passed five years in exile in the United States, residing in Philadelphia. Both parties in France reviled him, and an effort was made to condemn him to death. At last, in 1819, he was restored to his titles and estates, though not given the rank of marshal. He lived in retirement near Caen, constantly defending his conduct in 1815 in pamphlets and letters. After the July revolution of 1830 Louis Philippe recognized him as a marshal of France, and he resumed his seat in the Chamber of Peers. He was forced from time to time to defend himself against the attacks of his former generals of staff, and died May 29, 1847, before he was fully rehabilitated. His most important writings appear in the *Fragments historiques relatifs à la campagne et à la bataille de Waterloo* (Paris, 1830). Consult also: *Mémoires du maréchal Marquis de Grouchy*, edited by his grandson (Paris, 1873–74); the histories of the campaign of 1815 by Jomini (ib., 1841), Charras (Brussels, 1857), Quinet (Paris, 1862); E. Perret, *Le Maréchal de Grouchy* (ib., 1895); Houssaye (ib., 1899); J. B. Jourdan, *Mémoires militaires* (ib., 1899); W. H. Kelly, *The Battle of Wavre and Grouchy's Retreat* (London, 1905). See Waterloo.

GROUND (AS. *grund*, ground, earth, foundation). In painting, the material with which the canvas or panel is covered preparatory to painting, also called *priming*. In panel painting the Italians generally covered the wood with a sort of plaster, called "gesso," upon which the ground, generally a dull red, was painted. Canvases are known as absorbent or nonabsorbent, single-primed or double-primed, and are thus prepared to meet the taste of the artist, both as regards their character and their color. The Dutch and Flemings chose light tints, varying from white to gray. This is also the present practice. The preparation of grounds was formerly considered of great importance, but modern painters attach less importance to priming. A good uniform ground of light tint is generally acceptable, as the covering of the pigments is now, in all competent work, of so great a body and thickness that the ground counts for little or nothing in the final processes of a painting. In etching (q.v.) the term is used to denote the coat of varnish applied to the plate upon which the design is drawn. In relief sculpture it means the flat surface from which the figures project.

GROUND ALMOND. See CHUFA.

GROUND ANNUAL. In the law of Scotland, an annual rent or annuity paid by the owner of land to a creditor or to the unpaid vendor of the land. Thus, when a vendor sells his land and, instead of taking a lump sum for the price, reserves a sum by way of a perpetual annuity or rent, he conveys the land in fee to the disponee or purchaser, subject to this ground annual, which is a burden on the lands forever after. The vendor or creditor is called the ground annualer, and if the ground annual is not paid he is entitled as a remedy to poind the ground, i.e., seize all the goods, whether of the owner or his tenants, which are found on the lands and pay himself, or he may sue the debtor. But he cannot, as a ground landlord can do in England, poind the goods of the debtor's tenants to a greater extent than the current term's rent or arrears due by them. The ground annual is the Scottish equivalent of the rent charge reserved by the vendor of land in England, and of the fee-farm rent of American law, while poinding is the common-law remedy of distress (q.v.).

GROUND BASS. See *basso ostinato* under BASS.

GROUND BEETLE. A beetle of one of the largest and most important families of beetles, Carabidæ, so called because it lives on or beneath the surface of the soil. About 15,000 species have been described in this family, of which over 100 genera and 1200 species occur in North America. Most of them are predaceous and carnivorous, and both adults and larvæ are swift runners. Their colors are dull metallic blue, green, brown, or black, and they are often ornamented by longitudinal ridges and rows of punctures. Both adults and larvæ feed mainly upon insects, slugs, and snails, but also eat dead animal flesh. Some forms eat young growing corn, young seeds, and ripe strawberries. The family is generally useful to agriculture, for its various members feed on such destructive forms as the potato beetle and its larvæ, the June beetle and cutworm. Certain species even ascend trees in search of cankerworms and plum curculios. Seashore forms feed on the beach flea (*Gammarus*). A number of blind species inhabit caves both in Europe and America (see CAVE ANIMALS), and other small blind forms dwell under large stones. Not one of this last class has ever been found aboveground, so that each colony may have been confined for generations under its respective stone. Certain other species live under stones at the seashore, which are covered at each high tide, and come out only when the tide is low. Still others occur in the nests of termites; these so strongly resemble the termite queens that one may easily mistake the one for the other, and they probably prey upon the termites. Some forms produce a loud noise by raising the tip of the abdomen and rubbing it against a file on the wing cases. These are the "squeakers" that are sold in Covent Garden market, London. Some forms are aquatic, and others live in wet sands of rivers and pools. Certain adult and larval forms lie awaiting their prey in holes in the ground, from which they bound out when the victim is sufficiently near. The overpoweringly fetid odor of a small species (*Nomius pygmæus*) is described by Barrows (*Proc. Assoc. Econ. Ent.*, Washington, 1897). In the United States the ground beetles can only be confused with the darkling beetles (Tenebrionidæ) of California; the ground beetles have five-jointed tarsi, while the darklings have only four joints in the hind tarsi. The "searcher" (*Calosoma scrutator*) is one of our commonest ground beetles. It is violet, blue, and green, with red margins on the wing covers, and sometimes ascends trees in search of caterpillars. Another species (*Lebia grandis*), which closely resembles the bombardiers and is frequently an enemy of the potato beetle, and the genus *Harpalus*, are other common ground beetles. The last named are black and feed to a considerable extent on cutworms. See Plate of INSECTS.

GROUND CHERRY. See PHYSALIS.

GROUND CUCKOO. See COUCAL.

GROUND DOVE, or **GROUND PIGEON.** A pigeon of terrestrial habits. Several genera have short and rounded wings, with much inferior power of flight to pigeons in general; their legs are longer, and their feet rather adapted for walking than for grasping. They are little arboreal in their habits, but live mostly on the ground. Many of them run very quickly. They have not in general much brilliancy of plumage, but among them are the beautiful bronzewings (q.v.) of Australia. In the southern United States, Bermuda, and the West Indies the name "ground dove" is especially applied to the diminutive little dove (*Chæmepelia passerina terrestris*), a plain-colored but handsome bird, which is common in these regions. These doves are less than 7 inches long, are almost always on the ground (though they roost at night in trees), and are common in the roads, where they show little fear of man. They are generally seen in pairs and seem greatly attached to each other. See Plate of PIGEONS.

GROUND GAME. In English law, hares and rabbits, which are by statute (the Ground Game Act, 1880, 43 and 44 Vict., c. 47) subject to destruction by the occupiers of lands to protect their crops from injury and loss. The effect of this statute is to remove from game of this description the protection which, in the interests of the sporting classes, the English law throws about wild animals which are hunted for sport. Ordinarily the possession of land confers no right to kill or snare game found thereon; but the tendency of rabbits to increase and multiply and their destructive character have led Parliament to make an exception of game of this kind. It appears to be not uncommon in England to provide in a lease of agricultural land that the lessor or lessee, as the case may be, shall "keep down" the ground game. See GAME LAWS; HUNTING.

GROUND HOG. 1. The name in the Southern United States of the marmot (*Arctomys monax*), better named "woodchuck" (q.v.). 2. In South Africa, the aardvark (q.v.).

GROUND HORN'BILL. A hornbill of the African subfamily Bucoracinæ, characterized by hollow casques and by habits and an organization suited to terrestrial life. Two species are known, a northern (*Bucorax abyssinicus*) and a southern, the "bromvogel" of the Boers (*Bucorax caffer*). Both are large birds, the Abyssinian being 3½ feet long and of stout build, with a casque open in front. The southern species has the casque closed. Both are wholly black, except the wing quills, which are white. They go about in small flocks and are fearless, but when too much alarmed fly into trees for safety. They eat anything they can find—fruits, insects, crayfish, small reptiles, mice, and snakes. They are noted for their antipathy to snakes and their cunning in overcoming them. When a snake is discovered, they approach it, holding their wings stretched out and flapping the reptile with them until it is induced to seize a feather. Then all the birds attack it and peck it to death. If the snake advances, the bird threatened folds its wings as a shield in front of it and by manœuvres and assaults soon overcomes even the death adder. They place their nests in cavities or broken trees. The natives of South Africa hold this bird in superstitious abhorrence, its alleged foretelling of storms being the least of its sins in their sight. See HORNBILL.

GROUND IVY, *Nepeta glechoma.* A plant belonging to the family Labiatæ, a native of Europe, widely introduced in America, which grows in the dry soils of waste places, hedges, etc. It has a creeping stem, kidney-shaped crenate leaves, and axillary blue flowers in threes. The plant is stimulant, aromatic, and is used in pectoral complaints. A tea prepared from the leaves was formerly in great repute. The leaves were once used in England for clarifying and flavoring ale, which was then called gill ale, from gill-over-the-ground, an old name of this plant; but this use has been discontinued since the introduction of hops.

GROUND LAUREL. See ARBUTUS, TRAILING.

GROUND'LING. A small loach (*Leuciscus tænia*) of English rivers and ponds, keeping close to the bottom. See LOACH; Plate of CARPS AND ALLIES.

GROUND'NUT'. A term variously employed to denote the seed of the peanut (*Arachis hypogæa*) and the tubers of certain umbelliferous and leguminous plants, especially *Apios tuberosa*, also called earthnut. See PEANUT.

GROUND PINE. See CLUB MOSS.

GROUND PINK. See PHLOX.

GROUND RAT, or **GROUND PIG.** A burrowing, ratlike rodent (*Aulacodus swinderianus*) of South and West Africa. It is 2 feet long and has very harsh, bristly hair, flattened, grooved, and brown in color. It is a near relative of the spiny rodents of tropical America, such as the coypu, hutia, and others of the family Octodontidæ.

GROUND RENT. In England, the rent reserved on land leased for a long term of years for improvement. The additional value imparted to the land by the erection of buildings and other improvements constitutes this a safe and convenient form of investment. In England and in some parts of the United States the remedy of distress (q.v.) exists in favor of the ground landlord. Unless otherwise provided in the lease, the improvements constitute fixtures and become the property of the owner of the soil.

The practice of hiring ground for building purposes exists in the United States, and the law is similar to that of England on this point. But in most of the States there is no right to distrain the tenant's chattels in case of failure to pay the rent. The landlord will simply have an action for the amount of rent due, or he may, if it be so provided, dispossess the tenant and resume possession of the premises himself.

In Pennsylvania the term "ground rent" is employed for rent charge or fee-farm rent to describe the rent reserved to the grantor of an estate in fee simple.

GROUND ROBIN. See CHEWINK.

GROUND SEA. A West Indian name for a *roller*, especially in the Bay of Campeche and the north coasts of Honduras, Panama, Colombia, and Venezuela. The sea rises in long swells or billows, usually from a northerly direction, which increase in height as the shore is approached, and break there with great force. The ground sea may occur in a calm and otherwise smooth sea and with no indications of a previous or coming gale. It has been suggested that they are due to "northers" blowing farther to the north. In the Gulf of California and other parts of the world, particularly in the tropics, similar phenomena occur.

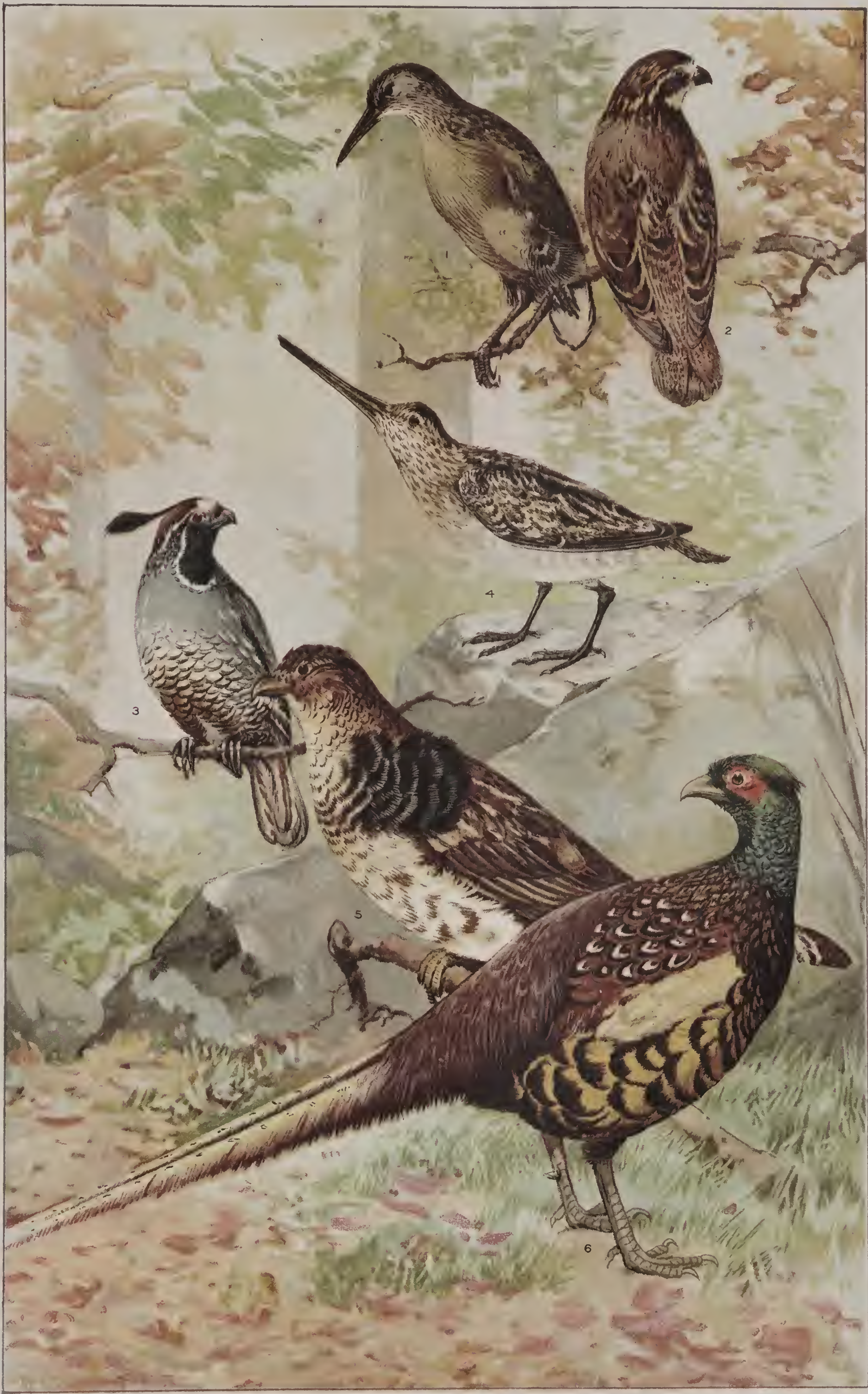
GROUND SLOTH. See GANODONTA.

GROUND SLUICING. See GOLD.

GROUND SNAKE. Any of the small, wormlike serpents of the North American genus *Carphophis*, which are the most lowly of Colubridæ and represent the typical forest burrowers of Central and South America. They are harmless little snakes, about the size of a slate pencil, and with no apparent neck, and are likely to be found under stones or beneath or inside of decayed logs. Frequently they also force their way under the bark of trees, an operation in which they exert considerable muscular effort. The species most commonly seen, and to be found in all the south central states, is *Carphophis amœnus*, which is glossy, opalescent, chestnut brown above, and bright salmon color beneath. Another species or subspecies (*Carphophis vermis*), the "ground worm" of the lower Mississippi valley, is large and purplish brown in color above, while below it is broadly flesh-colored.

GROUND SQUIR'REL. A group of squirrels, differing from the true squirrels in the possession of cheek pouches, in having a more slender body and shorter legs, and in living chiefly on the ground, and seldom climbing trees to any considerable height. They are of small size, are longitudinally striped on the back and sides, are extremely active and restless, and emit a peculiar chipping sound. The striped spermophile, or gopher (q.v.), so troublesome in the Northwest, and the chipmunk (q.v.) are familiar American examples. See Plates of GOPHERS and SQUIRRELS.

COMMON GAME BIRDS



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1 VIRGINIA RAIL - RALLUS VIRGINIANUS
2 COMMON QUAIL - COLINUS VIRGINIANUS
3 CALIFORNIA QUAIL - LOPHORTYX CALIFORNICA
4 WILSON'S SNIPE - GALLINAGO DELICATA
5 RUFFED GROUSE - BONASA UMBELLUS
6 PHEASANT - PHASIANUS COLCHICUS

GROUND SWELL. A long smooth swell, frequently occurring along a coast where the ocean bed is not far below the surface for a long distance from the land. While often found in fair or calm weather, it is due to deep-water disturbances from heavy winds. Where the water is very shoal, the swell or roller breaks as it rolls in, forming a series of breakers which smooth down again before reaching shore if the flat is of great extent.

GROUND TACKLE. Anchors and chains, and tackles, ropes, etc., used in working the anchors are included by the general expression *ground tackle*. See Anchor.

GROUND THRUSH. A pitta (q.v.).

GROUND WORM. See Ground Snake.

GROUP (Fr. *groupe*, from It. *gruppo*, *groppo*, cluster, knot, borrowed from the Germanic; cf. OHG. *kropf*, Ger. *Kropf*, AS. *cropp*, Eng. *crop*). In the fine arts, a collection of figures or objects related to each other and to a general design so combined as to produce a harmonious whole. For the principles of grouping, conventional and otherwise, see Composition.

GROUP'ER (probably from Sp. *garrupa*, from the American Indian name). A general name for the fishes of the genus *Epinephelus*, typical of the group Epinephalinæ, a section of the sea-bass family Serranidæ. It is the largest, most widely distributed, and most important genus of the Serranidæ. They are mainly of large size and occur frequently in all the tropical seas, where they are valuable for food. About a dozen species are known on the southern coast of the United States and about the West Indies, where various ones are called cabrilla, cherna, guasa, and mero by Spanish-speaking fishermen, hind in the British Islands and at the Cape of Good Hope, and jewfish (q.v.) in Florida. They have a robust, powerful form, and are usually greenish gray, or orange brown, varied with many blotches and bars, and with dark fins—on the whole, very handsome fishes. The best-known and most common American species is the red grouper (*Epinephelus morio*), which ranges from Virginia to Brazil. It averages about 2 feet in length and is generally gray, but reddish about the mouth, this color deepening and spreading with age. It remains near the bottom, not far from shore, feeds on crabs and small fish, and when caught offers no resistance. It is an important food fish, but not of the first quality in flavor. Another much smaller species (*Epinephelus maculosus*) is the red hind, or cabrilla, so constantly seen in the markets of Havana. The common Nassau, or Bermudan, grouper (*Epinephelus striatus*) is larger; and the rock hind, or cabra mora (*Epinephelus adscensionis*), which is also known on the African coast, ranks highest of all as a table fish. The black grouper of Key West (*Mycteroperca bonaci*), also called aguaji, represents an allied genus, several species of which are called groupers, rockfish, or bonacis, and are large and important food fishes. The great jewfish, or warsaw (*Garrupa nigrita*), is also sometimes denominated black grouper. See Guasa; Jewfish; Rockfish; Sea Bass; Scamp; and Colored Plate of Philippine Fishes.

GROUPS, in Mathematics. See Substitution.

GROUSE (a false singular, after the analogy of *louse*, *mouse*, as singulars of *lice*, *mice*, from *grice*, *grise*, *greese*, gray, from OF. *griesche*, gray moor hen, variant of *gris*, *gray*, from OHG. *grīs*, Ger. *greis*, gray). A game bird of that section of the rough-footed gallinaceous family Tetraonidæ which includes the larger forms; one of the Tetraoninæ. They are distinguished among birds of their class by their completely feathered shanks (except *Bonasa*), also by the fact that feathers fill the nasal groove and conceal the nostrils. The toes usually are naked, but are feathered to the claws in ptarmigans (q.v.), and they have pectinations of scales along the edges, which are deciduous. The tail feathers are from 16 to 18 and sometimes even 22 in number; and in shape the tail is acute, rounded, or forked. The orbital region usually is somewhat bare, and there is above the upper eyelid a naked stripe, marked by short, fringe-like processes. Many genera have an inflatable air sac on the side of the neck. Often the sides of the neck are further adorned by elongated feathers. The plumage is thick, soft, and handsome, but gay colors and patterns are absent; blacks, purples, and dark greens occur in some forms, but variegated browns, reds, and grays prevail in most species, and there is usually a considerable difference in color and ornamentation between the sexes and some seasonal changes; one genus (*Lagopus*) turns white in winter. (See Ptarmigan.) The grouse, as a rule, are birds of the forest, but some genera are found in open regions only, and the ptarmigans chiefly inhabit mountain tops. All, however, seek their food principally and nest wholly on the ground. The food consists of seeds, berries, buds, leaves, insects, worms, small snails, and so on, varying with region, season, and opportunity. The nest is a rude bed of leaves, twigs, and the like, and from six to fifteen eggs are laid, which are brownish and spotted—among the ptarmigans very heavily. All except the ptarmigans are polygamous, and the cocks indulge in demonstrative courtships (see Capercaillie), make various sounds with their wings (see below), and contest fiercely for the possession of their harems, as is the habit of most gallinaceous birds. They trust mainly to concealment for safety and remain motionless on the ground or perched in a tree until fear overcomes their prudence, when they spring away with a startling *whir* of the wings and astonishing speed. Hence trained dogs are needed to find and flush them, and much skill in shooting is required to bring them down in flight, but some of the forest-haunting species will not leave the supposed safety of a tree perch and are easily killed. They are favorites of sportsmen wherever they occur, and all are most excellent eating, except the few whose flesh is tainted by their bitter or resinous food. Great numbers are shot for the markets in all northern countries. A brief account of the principal species follows:

Capercaillie and Blackcock. The largest of all grouse is the European capercaillie (q.v.). Next in importance to it in Europe ranks the black grouse, or heathcock (*Lyrurus tetrix*), which is the bird to which the name "grouse" primarily applies, although in popular English speech the red grouse, or moor fowl, is meant. On the Continent it occurs both in mountainous and marshy countries, as far south as the Apennines. It abounds in most parts of Scandinavia, Russia, and Siberia, and is abundant in Great Britain wherever there are extensive moors or favorable spaces for it. The male, which is much larger than the female, and sometimes weighs four pounds, is a shining bluish black, with a conspicuous white bar on the wings, and a mixture of black and white on the legs; there is a piece of bare scarlet skin over the eye; the outer feathers on each side of the tail are elongated and curve outward, giving it a very peculiar appearance. The female, called "gray hen," is of a rust color, darkest on the upper parts, everywhere barred and mottled with a darker color; the tail is straight and even at the end. The young males resemble the females in plumage. It is a gregarious bird, the different sexes, however, in winter generally keeping in flocks by themselves; and, where they are well protected, they often venture into old turnip and stubble fields to feed.

Red Grouse. This, the ordinary "grouse" of Great Britain, the shooting of which, beginning on August 12, is so important a part of the British sportsman's year, is, properly speaking, a ptarmigan and is described under that title.

Ruffed Grouse or Partridge. The best-known American grouse is the bird called "partridge" in the North and "pheasant" in the South, but it is properly the ruffed grouse (*Bonasa umbellus*). This familiar and highly prized game bird, the flesh of which is incomparably superior to that of any other grouse, is found throughout North America from the Atlantic to the Pacific, from Virginia and northern Georgia to Alaska. It is nearly 1½ feet long, and the plumage is handsomely variegated with gray, red brown, and black. The tail is composed of 18 feathers and is crossed near its tip by a broad band of black or brown. On each side of the neck is a tuft of broad, glossy black feathers. These grouse live in woodland, where their nests are made on the ground at the base of a tree or shrub. The eggs are buff-colored, and a dozen, more or less, are laid. (See Colored Plate of GAME BIRDS accompanying this article.) The hazel grouse (*Bonasa betulina*) of Europe and Asia is a nearly allied species.

One characteristic of this species—its "drumming"—is known to almost every one, yet the method of it is widely misunderstood. The sound is produced by the male only and is most frequent and vigorous in the spring, when it may be regarded as a challenge to other cocks and for the entertainment of the hens; but as it is heard also in summer, and especially in autumn, it cannot be wholly a sexual expression. It may be only an expression of vigor. The manner in which the long, muffled roll, resounding to a great distance through the woods, is produced, was long a puzzle or most fancifully explained. It was at first supposed to be a vocal effort, whence comes the generic name "Bonasa" (from *bonasus*, a bull). The true explanation is that the bird sits crosswise upon the chosen log, resting upon the back of the tarsi, its tail spread horizontally, and its head drawn back. "The wings are then raised and stiffened, and drumming commences by a slow, hard stroke with both wings downward and forward; but they are stopped before they touch the body. The rapidity of this motion is increased after the first few beats, when the wings move so fast that only a semicircular haze over the bird is visible, the rapid vibration causing the rolling noise with which the sound terminates." So says Henshaw, and Coues and other field ornithologists confirm the statement.

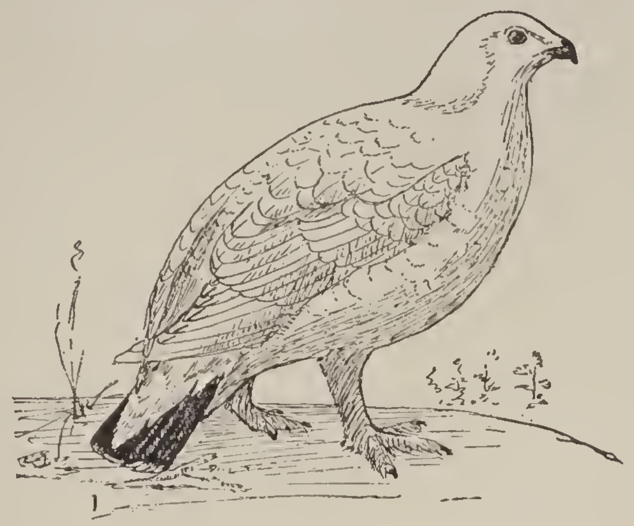
Prairie Chickens. The Eastern prairie chicken, or pinnated grouse (*Tympanuchus americanus*), is a trifle larger than the ruffed grouse. The general color of the plumage is rufous, with bars and crossings of black; the tail is short and rounded. The male has neck tufts of narrow feathers, the largest of which are 5 inches long; he is more remarkably adorned with two loose pendulous wrinkled patches of skin extending along the sides of the neck for two-thirds of its length, capable of inflation with air, and when inflated resembling in bulk, color, and surface middle-sized oranges. This grouse chiefly inhabits dry open districts, from northwestern Ohio, Indiana, and Kentucky westward to central Kansas and the Dakotas. It was at one time abundant on the Western prairies, but has always become rare as a district has become cultivated and populous, notwithstanding laws enacted for its preservation. It has almost disappeared from the State of Kentucky, where it was at one time so extremely abundant that children were constantly employed to prevent its depredations in the cultivated fields, and multitudes were shot and trapped merely to be thrown away. It congregates in flocks in winter, which break up into smaller parties in spring. The males have many combats at the approach of the breeding season. Their voice is a low "tooting," or "booming." They strut, after the manner of turkey cocks, with wings let down to the ground and neck feathers erected. Certain spots, known as "scratching places," seem to be specially appropriated for their displays and combats, and there considerable numbers often meet about daybreak and disperse again after the sun is up. The food of the pinnated grouse consists of seeds, berries, the buds of trees and bushes, insects, and the like.

A very closely allied species, the American heath hen (*Tympanuchus cupido*), formerly dwelt in favorable localities in the Middle States and southern New England. Long Island and Cape Cod were its strongholds. It was long confounded with the more widely distributed prairie chicken, and is now extinct, except a small band on Nantucket Island, which is dwindling away in spite of such protection as can be given them. In 1890 less than 200 were living on Nantucket and Martha's Vineyard, and in 1912 it was thought that less than 50 remained. See EXTINCT ANIMALS.

The "prairie chicken" of the Northwest is more strictly to be called sharp-tailed grouse (*Pediocœtes phasianellus*), of which there is a northern and a southern race. It is easily distinguished by the extra long middle pair of tail feathers and the darker plumage—clear dusky black above, with no buff about the head. The back is variegated with transverse zigzags of yellowish brown, and there are many white spots on the wings; below, the plumage is white, thickly marked with triangular spots of drab. The sexes are alike. In the southernmost parts of their range they associate with the prairie chicken and vary their habits northward only as their environment changes. The northern variety extends from the Saskatchewan valley to the borders of the Arctic regions.

Sage Grouse. This species (*Centrocercus urophasianus*), called in old books "cock-of-the-plains," is a very large grouse which inhabits the sagebrush districts of the western United States. See SAGE GROUSE.

GROUSE, ETC.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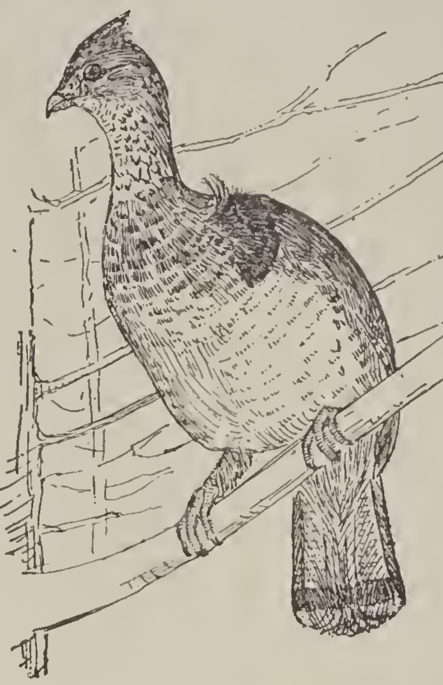
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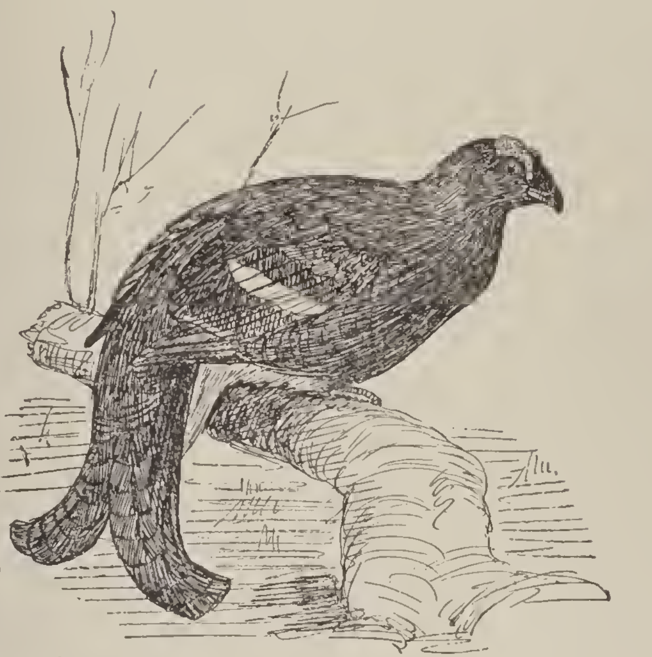
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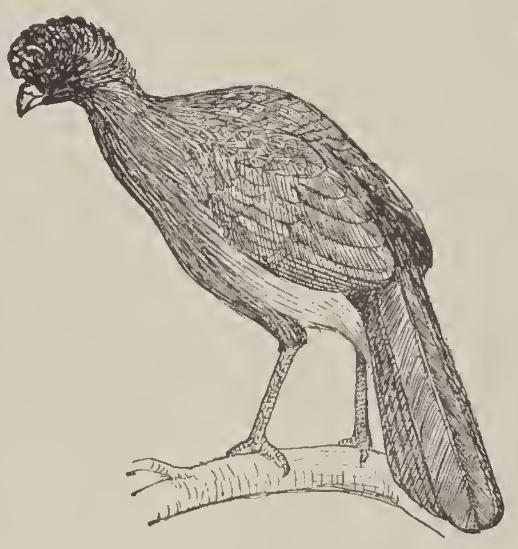
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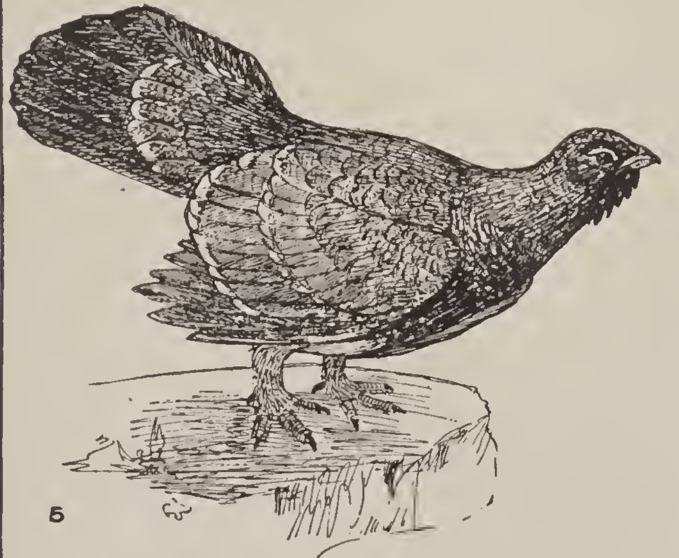
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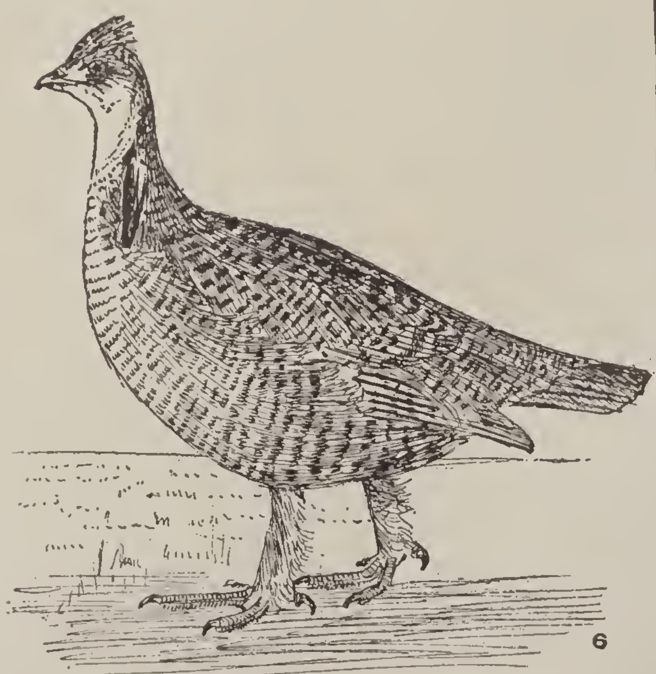
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1. WILLOW PTARMIGAN (Lagopus albus); winter plumage.
2. RUFFED GROUSE (Bonasa umbellus); male.
3. BLACK GROUSE (Tetrao tetrix); male.
4. CRESTED GUAN or CURASSOW (Crax alector); male.
5. CAPERCAILZIE (Tetrao urogallus); male.
6. PRAIRIE CHICKEN (Tympanuchus Americanus); male.

Wood Grouse. The remaining species of American grouse are denizens of forests. A very widely distributed form is the Canada grouse, or "spruce partridge" (*Canachites canadensis*), a Western variety of which is called Franklin's grouse, or "fool hen." It is plentiful throughout the forests of Canada, from Maine to Alaska, and when disturbed takes refuge in trees, whence a flock may be shot, one by one, without scaring the others away. In winter it feeds mainly on the leaves and young sprouts of the spruce, which taint its flesh. Its plumage is distinctly barred above with plumbeous and black; beneath it is black, with a white border to the throat and white across the breast and on the sides. The females show a duller mixture of yellowish orange, gray, and black. The Eastern and Western (Franklin's) varieties may be distinguished by their tails: that of the former is rounded and tipped with rufous, while that of the latter is nearly even, black to the tip, and has the upper tail coverts (see BIRD) broadly tipped with pure white. A Siberian grouse (*Canachites falcipennis*) is closely allied to this. A still larger Western wood grouse is the "blue," "dusky," or "pine" grouse (*Dendragapus obscurus*). It approaches the capercaillie in size and may be regarded as the American analogue of the blackcock. Its general color is blackish brown; the wings are lighter and the tail large, rounded, and composed of 18 or 20 feathers. They keep in the coniferous forests for the most part and occur throughout the mountain regions from Colorado to central California and northward. For the Arctic grouse (*Lagopus*), see PTARMIGAN.

Bibliography. Standard works of ornithology and field sports. The fullest general account of American grouse is contained in Coues, *Birds of the Northwest* (Washington, 1874). Consult also: Leffingwell and others, *Shooting on Upland, Marsh, and Stream* (Chicago, 1890); Sandys and others, *Upland Game Birds* (New York, 1902); Lloyd, *Game Birds and Wildfowl of Sweden and Norway* (London, 1867); Morris, *British Game Birds* (ib., 1891); Millais, *Natural History of British Game Birds* (ib., 1909); Malcolm and Maxwell, *Grouse and Grouse Moors* (ib., 1910); A. S. Leslie, *Grouse in Health and Disease* (2 vols., ib., 1911). See Plate of GROUSE.

GROUSE'S DAY, SAINT. An English sporting term, used of the 12th of August, when the shooting season opens.

GROUSSET, grōō′sȧ′, PASCHAL (1844–1909). A French politician and author, born at Corte in Corsica. He studied medicine in Paris, but immediately took up journalism, wrote scientific articles for *L'Etendard* and *Le Figaro* under the name "Docteur Blasius," and began to write fiction under the pseudonym "Léopold Virey." He joined Henri de Rochefort in the management of *La Marseillaise* in 1869 and in January, 1870, quarreled with Prince Pierre Bonaparte and sent two seconds to answer his challenge. One of these, Victor Noir, was killed by the Prince. This deepened Grousset's opposition to the Empire, and he attacked it bitterly in *La Marseillaise* and was condemned to heavy fines and repeated imprisonments. He took part in the insurrection of March, 1871, was elected a member of the Commune, and took charge of foreign affairs, but on his attempt to leave Paris in June was arrested and deported to New Caledonia. He escaped with Rochefort and others (1874), went to England, acted as London correspondent of *Le Temps*, under the name "Philippe Daryl," and returned to Paris in 1881. Defeated in the elections of that year, he was chosen deputy in 1893 and reëlected in 1898, 1902, and 1906 as a Socialist. He wrote political sketches, *Le bilan de l'année 1868* (1869), *La conspiration du général Malet* (1869), and *Les origines d'une dynastie, le coup d'état de Brumaire an VIII* (1869), as well as the autobiographic *Les condamnés politiques en Nouvelle Calédonie* (with Jourde, 1876); notes of travel and life abroad, *La vie partout* (1884–88); *Scènes de la vie de collège dans tous les pays* (1881–91); translations of Stevenson's *Treasure Island* and of Mayne Reid's novels; and *L'Héritier de Robinson* (1884); *L'Epave du Cynthia*, with Jules Verne (1885); *Le capitaine Trafalgar* (1886); *Le secret du mage* (1890); *Atlantis* (1896). "Tiburce Moray" is another of Grousset's pseudonyms. As editor in chief of *L'Education Physique*, he did much to introduce the English idea of athletics in France.

GROUT. See MORTAR.

GROVE, SIR GEORGE (1820–1900). An English engineer and musical critic, born at Clapham. After studying at the grammar school there he was articled to Alexander Gordon, worked at Napier's factory in Glasgow, was employed in the building of Morant Point Lighthouse in Jamaica (1841) and of Gibb's Hill Light in Bermuda (1845), and then worked on the Britannia Tubular Bridge over Menai Strait. In 1850 he was secretary to the Society of Arts, but resigned this post (1852) to become secretary of the Crystal Palace. Here he first made an effort to educate English musical taste, especially for Beethoven and the Romantic German school. In 1867 he traveled to Vienna with Arthur Sullivan and discovered the part books of Schubert's music to *Rosamunde*. His abilities as a critic of music brought him into connection with the Macmillans. He was editor of their magazine from 1868 to 1883 and of the valuable *Dictionary of Music and Musicians* (1879–89; new ed., 1904–09), and wrote *Beethoven and his Nine Symphonies* (1896). For 12 years he was director of the Royal College of Music. He was knighted in 1883 and made Companion of the Bath in 1894. His work in biblical geography was also important. He wrote articles for Smith's *Dictionary of the Bible* (London, 1864), assisted Stanley in his *Sinai and Palestine* (New York, 1865), and was influential in the promotion of the Palestine Exploration Fund. Consult Graves, *The Life of Sir George Grove* (London, 1901).

GROVE, SIR WILLIAM ROBERT (1811–96). An English physicist, born at Swansea. He graduated at Brasenose College, Oxford, in 1832, was called to the bar in 1835, and began the practice of law, but left it for the study of physics. He was professor of experimental philosophy in the London Institution from 1840 to 1847, was a member for some time of the council of the Royal Society, and in 1847 received the Royal medal for a paper on "The Gas Voltaic Battery." Returning to the law, he became prominent in the South Wales and Chester circuits. He became a justice of Common Pleas in 1871 and in the following year was knighted. Afterward he became judge of the High Court of Justice, from which position, however, he retired in 1887 and thereafter until his death devoted himself to scientific investigations. In

1842 he delivered a lecture on "The Progress of Physical Science," in which he propounded for the first time the doctrine that the so-called forces of nature, such as heat, electricity, etc., are not essentially dissimilar; that they are nothing but different modes of motion, different and mutually convertible forms of something which is called *energy*, and of which the most essential characteristic is its indestructibility. Grove was thus one of the first to grasp and enunciate what Faraday has called "the highest law in physical science which our faculties permit us to perceive—the conservation of force." These views were further developed in the famous essay on *The Correlation of Physical Forces* (1846). Grove published several works on subjects connected with electricity, containing the results of his acute experimental investigations. He also made important improvements in electrical apparatus and invented a well-known galvanic battery which bears his name. See ELECTRICITY.

GROVE CITY. A borough in Mercer Co., Pa., 70 miles north of Pittsburgh, on the Bessemer and Lake Erie Railroad (Map: Pennsylvania, A 4). It has a Carnegie library, a branch of the George Junior Republic, and an Odd Fellows' Home, and is the seat of Grove City College, opened in 1884. There are manufactures of carriages, gas engines, foundry products, brooms, motor trucks, etc. The borough owns and operates its water works and electric-light plant. Pop., 1900, 1599; 1910, 3674.

GRO'VER, CUVIER (1829–85). An American soldier, born in Bethel, Me. He graduated at West Point in 1850, served on frontier duty at Fort Leavenworth, Kans., until 1853, took part in the Northern Pacific Railroad expedition of 1853–54, and was again stationed at various frontier forts until the outbreak of the Civil War. He was made a brigadier general of United States volunteers in April, 1862, participated in the Peninsular campaign, was brevetted lieutenant colonel on May 5 for his conduct at the battle of Williamsburg, and on May 31 was brevetted colonel for gallantry at Fair Oaks. He took part in the battle of Glendale, and his brigade was especially distinguished for valor at the battle of Manassas. From December, 1862, until July, 1864, he was in command of a division of the Nineteenth Corps, Department of the Gulf, and directed the right wing of the army in the siege of Port Hudson, La. In October, 1864, he was brevetted major general of volunteers for his conduct at the battles of Winchester and Fisher's Hill; and his gallantry at the battle of Cedar Creek and in the Shenandoah campaign earned for him, on March 13, 1865, the brevet of brigadier general in the United States army. He was also brevetted major general on the same day for services during the whole war. He subsequently returned to frontier duty, served as assistant inspector general of the fifth military district in 1869–70, and while on sick leave died at Atlantic City, N. J.

GROVER, LA FAYETTE (1823–1911). An American lawyer and politician. He was born in Bethel, Me., was educated at Bowdoin College, and in 1850 was admitted to the bar in Philadelphia. He moved to Oregon the following year, began practice at Salem, and served as prosecuting attorney of the Territory and auditor of public accounts in 1852. In 1853 he became a member of the Oregon Legislature, in which he served, in all, three terms, being Speaker in 1856. He fought in the Indian wars of 1853 and 1855–56, and was United States commissioner to settle Indian spoliation claims against the government in 1854–55. He was a member of the Oregon Constitutional Convention in 1857 and was the first representative of the State in Congress. He was chairman of the Democratic State Central Committee from 1866 to 1870 and was Governor from 1870 to 1877, when he resigned to enter the United States Senate, in which he served one term. He took a leading part in urging legislation to exclude Chinese from the United States. He returned to the Oregon House of Representatives in 1886 and served one term.

GROVES, SACRED. Groves associated with worship or religious rites. Such groves are found among many peoples. In the Authorized Version of the English Bible, the word "grove" occurs frequently as the translation of the Hebrew *'ashērāh;* this is generally admitted to be an error, and in the Revised Version the word is transferred without attempt at translation. (See ASHERA.) In two passages (Gen. xxi. 33; 1 Sam. xxii. 6, margin) "grove" represents the Hebrew *'ēshel*, tamarisk (cf. 1 Sam. xxxi. 13). A shrine may have been connected with the tree mentioned in the last passage, and in the first it is stated that Abraham planted a tamarisk in Beersheba "and called there on the name of Yahwe." There is mention of an oak by the sanctuary at Shechem (Josh. xxiv. 26) and at Bethel (Gen. xxxv. 8); certain other passages are by some interpreted as referring to trees (Authorized Version, "plain," Judg. iv. 11; ix. 6, 37). The tree occurs frequently on Assyrian sculptures. One of the Sumerian names of the city of Babylon was DIN-TIR (the grove of life), probably because the earliest religious centre of the place was a grove where rites were performed that were supposed to be life-giving.

Groves played an important part in connection with the religion of the ancient Greeks and Romans. To nature worshipers they seemed peculiarly appropriate sites for temples and oracles. The Greeks placed groves and forests under the protection of the god Pan and tenanted them with nymphs called dryads or hamadryads. Some of the earliest Greek oracles were supposed to be given at Dodona through the rustling of oak leaves. The famous Grove of the Academy was a public garden outside of Athens, where Plato taught. Perhaps the most famous sacred grove of the ancient Hellenic world was Daphne, situated in the environs of Antioch on the Orontes and consecrated by Seleucus Nicator to the worship of Apollo. The Romans derived the foundation of their religion from Numa, as of their political life from Romulus. Numa was believed to have received his religious instruction in a grove from a nymph Egeria. In this spot, thus consecrated by divine presence, he erected, according to tradition, a temple to the Camenæ. Seventeen miles southeast of Rome was a place, Nemi, where a famous temple was erected in a grove to Diana. See CAMENÆ; DAPHNE; DODONA; DRYADS; NEMI.

GROVE'TON. See BULL RUN, SECOND BATTLE OF.

GROW, GALUSHA AARON (1823–1907). An American politician, born at Ashford, Conn. He graduated at Amherst College in 1844 and was admitted to the Pennsylvania bar in 1847. Four years later he was elected to Congress from

Pennsylvania and continued to be a member of that body until 1863—the first half of the time as a Free Soil Democrat, the last as a Republican. From July 4, 1861, to March 3, 1863, he was Speaker of the House of Representatives; during that term he succeeded in passing a homestead law which he had persistently advocated. He was president of the International and Great Northern Railway from 1871 until 1876, a position which made it necessary for him to live in Texas. In the latter year, however, he returned to Pennsylvania. He declined the Russian mission in 1879. In 1894 he was elected Congressman at large by an overwhelming plurality and held that office until 1903. He lost his fortune in railroads and died destitute.

GROWING CROPS. These constitute a peculiar species of property in English and American law, being for some purposes regarded as real and for others as personal property. In general, while still affixed to the soil, they constitute a part of the freehold. The right to gather and use or sell them is an ordinary incident of the lawful possession of land, whether by the owner or by a tenant for life, for years, or at will. For the purpose of determining the rights of other parties than the possessors of the land, growing crops are divided into two classes, viz., those which are the natural growth of the soil, such as grass, timber, the fruit of trees, etc., called *fructus naturales;* and those produced by labor in cultivating, planting, etc., such as corn, oats, vegetables, and the like, which are known as *fructus industriales.* Both classes, on a conveyance of the land, pass with it to the purchaser unless expressly excepted or unless they have been previously sold by the possessor to a third person. But generally the industrial crop is subject to attachment or levy and sale as personal property, and upon the death of the owner of the land they pass to his personal representative and not with the land to his heir; whereas the natural crop is not subject to levy or attachment and descends as real property to the heir. Furthermore, *fructus industriales* are known as emblements, and may, where they are the result of the current year's labor, be taken by a tenant at will or by the personal representative of a tenant for life, even after the termination of the tenancy, where that occurred without the fault of the tenant and between the sowing and the reaping. See EMBLEMENTS.

As growing crops are often made a subject of sale while still standing, but with a view to their removal by the purchaser, it is evident that questions may arise as to their character as real or personal property under such circumstances. In general, it may be said, a present sale of such a crop, whether natural or industrial, with authority to the purchaser to remove it at his pleasure, vests in him the title thereto as personal property. He may, in his turn, assign the crop to a third person and vest in him the right to gather and remove it. From the moment of the original sale the vendor ceases to have any right in the crop, and his conveyance of the soil will not carry with it any right to the same; while, on the other hand, it is, though still attached to the vendor's land, subject to attachment or levy as the personal property of the purchaser. In contracts for the sale of standing crops it has been held that industrial crops are chattels and that, whether the title is to vest in the purchaser before or after severance, the agreement is not one for the sale of an interest in land and is therefore not governed by the fourth section of the Statute of Frauds (which requires agreements of that character to be in writing); whereas growing crops, if *fructus naturales*, are before severance a part of the soil and an agreement vesting title in them before severance is governed by that section. In either case, however, if the agreement contemplates the severance of the crop before the property vests in the purchaser, it is dealt with as personal property, and the statute has no application. See CHATTEL; FIXTURE; SALE.

GROWING PAINS. These are pains occurring in youth, particularly when growth is unduly rapid, and appearing in the ends of the long bones where bony growth takes place. The pains are neuralgic or rheumatic in character and are sometimes attended with fever and marked constitutional disturbance. The symptoms usually pass off without any bad results, but inflammation of the bone and irregular prominences sometimes are developed. By many authorities the disease is looked upon as a manifestation of rheumatism.

GROWTH (from *grow*, AS. *grōwan*, Icel. *grōa*, OHG. *gruoan;* connected with AS. *grœne*, Ger. *grün*, Eng. *green;* cf. also Icel. *grōþr*, *grōþi*, growth). Increase in size or volume. It is not to be confounded with development, which follows or accompanies growth and has to do with the unequal growth of parts of the organism, involving an increasing unlikeness of the different parts, i.e., a differentiation or specialization of the body. Hence development is the formation of a complex from what was originally a simple whole, as seen in the development of the flower or the chick, which both grow and unfold or develop.

Inorganic Growth. Growth, whether that of minerals, of our earth, the solar system, or even of the universe, is primarily due to the action of cosmic energy and of motion. Our solar system, the fixed stars and planets, have had a history, have grown, have developed. Geological history is a process of growth; the continents may be said to have gradually grown to their present size and shape. This is illustrated by the growth or simple increase in size of mineral or inorganic bodies. Crystals, under favorable conditions, grow by the addition of particles to the outside. There is a certain limit to their growth, and crystals are of different sizes—they take on a definite shape, related to the physical and chemical characters of the mineral substance. Verworn, however, thinks the contrast made between the crystal and the organism is "unfortunate." He states that "as regards its physical characteristics the living substance of organisms in its essentials ought to be compared with a liquid," and he goes on to state that "liquids grow by intussusception, i.e., if a soluble body be added to a liquid, e.g., salt to water, the latter dissolves the former and stores the molecules of the soluble body by diffusion between its own molecules, that is, there is here exactly the same process as in the growth of the organism." All this goes to show that growth or increase in size, together with some degree of development up to a certain stage (certainly not up to the cessation of power of reproduction), takes place in the inorganic world.

Organic Growth. As living beings fundamentally differ from mineral bodies, so growth in plants and animals is inherently different. Even organic growth is defined as increase in volume, but this does not go far enough. Living organisms are compounds or proteids of mineral matter, forming protoplasm, and they grow by adding to the substances forming their bodies similar substances or food, which is taken within the body by interstitial deposit (intussusception), and these are digested and assimilated. This causes an increase in the volume or bulk of the body. Organic growth is fundamentally a physicochemical process plus a form of constructive energy which we are unable to comprehend. In our present ignorance we invoke vital force, "growth force," or "bathmism," words which do not help us to understand what is behind the phenomenon of increase in volume. Besides simple increase in bulk, there is, as Ryder states, a process of rearrangement, further subdivision of and addition to the material basis of the organism. Growth, also, according to Ryder, proceeds everywhere by "adding to its substance at a rate which corresponds exactly with the rate at which the cube of the dimensions of the growing body is everywhere being increased. All growth is accompanied by movement, for as a cell increases in volume it becomes expanded." "Hence," says Verworn, "growth movements are common to all living substance, but they take place so slowly that they can scarcely be followed with the eye." That the phenomena of growth are powerful sources of energy is exemplified by the well-known fact that trees growing out of crevices in the rock are able by their roots to force apart huge masses of stone. See MECHANICS OF DEVELOPMENT.

Correlation of the Volumes and Surfaces of Organisms. It has been pointed out by Leuckart and by Herbert Spencer that, as organized unicellular bodies increase in bulk, their surfaces become proportionately less, and that this elementary rule of growth very probably leads to the necessity for segmentation or subdivision of the original cellular body, "owing to the unfavorable conditions which continuous growth establishes between the organism and its surroundings, thus developing unfavorable conditions for nutrition, respiration, and consequently for metabolism and growth in general." (Ryder.) But, as Ryder claims, there are "supplementary but equally important principles connected with the *geometrical ratios* with which the forces of growth, reproduction, and metabolism are simultaneously operative during the development, growth, and evolution of organic types"; and he claims that "without resort to another type or set of adjustments which living beings have effected in relation to the outer world, the present development of organized resistance, and even of animal motion and mentality, would in all probability have been an impossibility."

The primary form of living beings, as the lowest plants and animals, is that of a sphere, the spherical shape being due to gravity and surface tension. But Ryder points out that this shape is one "which is itself unfavorable for growth, with a proportionate and concomitant acquisition of new surface, since of all forms of bodies it is the very one which can contain the greatest amount of matter within the least amount of surface." Hence any departure from this primitive spherical form "will increase the proportional amount of enveloping surface in respect to the volume of enveloped matter." Hence, first, the tendency of organs to extend indefinitely in the form of a cylinder, with rounded or hemispherical ends, which becomes more and more attenuated as its length is increased, as in the nerves or blood vessels; and, secondly, the formation of flattened disklike bodies, such as the blood corpuscles.

Why do the nerves, blood vessels, etc., grow slender and branched? Ryder answers this question by saying that the indefinite stretching or flattening of a mass achieves the same thing "as splitting it up into a great many slender bars and placing these end to end, or, as splitting up the mass into a great many thin slices and joining these edge to edge. In both cases a great gain of surface is accomplished. Now, if a body branches rapidly, it does the same thing as is done when it is split up into a great many slender bars; namely, it increases its surface in a ratio corresponding exactly to the rate at which the splitting or branching takes place." This is what the vascular system has done. The branching of the blood vessels, with their innumerable ramifications, "is nothing more than a physiological response, developed in a geometrical ratio, to a corresponding rapid increase in the volume of the organized matter to be metabolized." So with the nervous system, "the extreme attenuation of the terminal and central interrelative fibres given off by the ganglion cells of the nervous system means a gain of surface in proportion to mass which is nowhere else paralleled by any active constituent tissue of animal bodies." The enormous development of the irritable surface is, he adds, correlated with the extreme irritability of the nervous system. This is exemplified by the tenacity of the nerve terminals of the auditory organs and the other organs of sense; while it is the most attenuated structures known to the histologist which are the most irritable, as cilia, flagella, etc. This subject is further illustrated by the stretching of plasma into threads, as the pseudopods of many protozoans, the branches and filaments or flattened leaflike forms of gills, as well as the roots and branches of plants. Thus, organisms higher than spherical protozoa have, after life began, proceeded, during their growth in volume, to develop surfaces according to this rule of geometrical progression.

Growth as a Function of Cells. As organisms are one or many celled, and as the many-celled plants or animals arise from a single cell (the seed or egg), growth is primarily a function of cells. During growth the cells undergo rapid multiplication, which causes the body to increase in weight, this being determined by the number of cells and their average weight. Increase in age affects the different cells unequally, and hence some cells are dividing while others are not. In the mature body a minority of the cells are in process of division, while the majority are not. (Minot.) Very few observations have been made as to measurement of the growth of animals. Semper measured that of the pond snail; but those of B. A. Gould and of H. P. Bowditch on man are more extensive and reliable. In animals, according to Minot, the rate of growth in weight for man, and for some few other animals, increases for about half the period of growth, then remains approximately constant for a short time, and finally slowly diminishes until it becomes zero.

Factors Concerned in Growth. These are chiefly external, such as abundance of food and other conditions of existence, as heat, light, etc. Hatschek assumes that in growth the simple molecule of living proteid continually attracts elements to itself from the food. Growth is more rapid in a well-fed animal or plant. Development of the higher organisms is usually introduced by a period of rapid cell division with almost no growth. This is followed by a period of rapid imbibition of water, during which the tissues are stretched, and growth occurs with great rapidity. Later still, the cell walls thicken, intercellular substance is deposited, and the dry weight slowly increases. This is the special period of assimilation and secretion. In the development of the frog the percentage of water rises to 96 when half a month old and then falls slowly. At six weeks from fertilization the human embryo consists of 97.5 per cent water, but at birth the proportion of water has fallen to 75 per cent, and in adult man it is 66 per cent. The growth processes may be classified as "transitory," in which growth is followed by a return to the former size, and "permanent" or developmental, in which there is a persisting enlargement which plays an important part in development. Transitory growth may be illustrated by the enlargement of those cells which cause the leaflets of the sensitive plant to turn; this enlargement is only temporary. Developmental growth is illustrated by the increase of the embryonic plant. Growth phenomena may also be classified as "diffused" or "localized." Diffused growth affects the entire individual or many of its parts, whereas in localized growth the process is confined to a limited region. In early development the whole animal swells by diffused growth; later, the separate organs enlarge as a result of localized growth. Although cell division usually accompanies growth, it is in no way the cause of growth. The curve of growth is obtained by joining with a line the tops of ordinates erected from a horizontal base line at equal time intervals, the height of the ordinates being proportional to the volume of the organism. A study of these growth curves shows that absolute increments of size are at first small, rapidly increase to a maximum, and then decline to zero. This decline to zero is not a necessary property of protoplasm, but it is an adaptation to the limited size which is advantageous to most animals.

Various external agents influence the rate of growth as follows: 1. *Chemical Agents.*—The assimilative and secretory are chemical processes. They require certain materials to work upon. These materials are the food of organisms. The principal elements found in the body are carbon, oxygen, nitrogen, calcium, phosphorus, potassium, sodium, chlorine, magnesium, sulphur, silicon, and iron, which enter the body in various combinations, while each plays a definite rôle. Since phosphorus is especially abundant in embryonic tissue, its peculiar importance for growth is indicated. Potassium is probably of great importance in imbibition. Iron is essential in the early processes of cell division. Besides the inorganic elements organic food is essential to the growth of animals; various chemical agents that are not built up into the organic body may accelerate growth by acting as a stimulus. Certain poisons do this.

2. *Water.*—The imbibition of water is an important growth process. Developing embryos are usually found in moist situations.

3. *Density of the Medium.*—The rapidity with which water is imbibed depends largely upon the osmotic pressure of the medium, and this is determined by its density. Regeneration of marine animals is hastened in dilute sea water, retarded in a concentrated solution. Pond organisms develop with abnormal slowness in a salt solution.

4. *Molar Agents.*—Quiet facilitates growth, and after a wound excessive growth takes place along the cut edge.

5. *Light.*—Light may retard or accelerate growth in different cases. Its effect is usually unfavorable to growth in young plants, and the growing tissue of vegetative plants is usually protected from the sun's rays. So, likewise, among animals the embryo is usually sheltered from the light by being carried in the maternal body, covered by eggshells, or placed in dark places. Acceleration of growth by light, on the other hand, takes place in certain aquatic algæ, especially diatoms, and in certain aquatic embryos (tadpoles, fish embryos, and young pond snails). In these processes of retardation and acceleration not all the component rays of white are equally effective. Thus, in general, the long-waved rays have no more effect than darkness except in forming starch. It is the active rays which retard the growth of aërial organisms, and it is the actinic rays which accelerate the growth of aquatic organisms.

6. *Temperature.*—Heat has a well-known effect on the rate of growth. For every organism there is a temperature to which it is attuned—at which growth takes place faster than at any other. As we lower the temperature, the rate of growth gradually and slowly diminishes; as we raise the temperature, the rate of growth diminishes more rapidly. The temperature of maximum growth (called the optimum) is closely related to the temperature to which the organism is normally subjected. See EVOLUTION.

7. *Extent of the Medium of Volume.*—Among the most remarkable factors determining the extent of growth of an animal is the amount of space it has to move in. It is well known that small trout occur in small brooks and large ones in greater streams. Some years ago Karl Semper reared pond snails in vessels containing different quantities of water. He found that there was a direct relation between the volume of the water and the length of the shell at the end of eight weeks. This experiment has since been repeated with care, and the result confirmed. The explanation of this phenomenon is difficult. It may be that there is a self-adjustment of the size of the snail to the space at its command. In fact, in all the phenomena of growth the phenomena of adaptation are striking.

As to the external factors which influence growth, we are very ignorant. Morgan speaks of a few isolated cases. From experiments in cutting off the tail of a minnow, in which particular regions are held in check while others grow at the maximum rate, the results demonstrate some sort of a formative influence in the new part. "An excellent example of an internal factor," Morgan says, "is found in the interrelations of the parts of the organism to each other." A most important factor in the growth of organisms of the present day is that of heredity (q.v.), for the existing forms of life are the descendants of innumerable generations. Growth, development, and reproduction are now proceeding in grooves as it were, or along more or less definite paths, in accordance with long-established laws, and heredity undoubtedly affects the mechanism of growth. As Cope has well said: "In bathmism we see the resultant of innumerable antecedent influences, which characterize the life of living beings."

When a worm multiplies by budding or by self-division, the new part grows or begins to form in a zone near the end of the body. This zone is called the "growing zone," or the "zone of proliferation," and here the nuclear substance is abundant in proportion to the enveloping protoplasm. This zone is still more definite in the embryos of all arthropods. It is situated between the penultimate and the last segment of the body, and from this zone the new segments arise and grow. It is also interesting to observe, as Packard states, that in striped or spotted caterpillars, as well as in lizards, the change in the origin and shape of the markings appears to originate at what corresponds to the zone of formative cells and then passes forward towards the head.

Growth is related to *longevity* (q.v.). That men, says Minot, are larger than rabbits because they grow for a longer period, is a common observation; but the facts tabulated by him show the curious result that the average daily increments in growth are nearly the same in man and rabbit. "On the other hand, rabbits attain a larger size than guinea pigs, not because they grow longer, but because they grow much faster. The rate of growth in guinea pigs and rabbits is not very different, as was to be expected in so nearly related animals; but it is sufficient to produce a great inequality in the final size, because the effect of the difference is accumulated, like compound interest on capital. The rate in man (0.02 per cent) is only $\frac{1}{25}$ of the rabbit's (0.5 per cent). This comparison renders it still more strikingly evident that the larger size of man depends on the greater duration of growth." The percentages given by Minot may, he says, be called the specific coefficients of growth. Together with the duration of growth, they determine the ultimate size of the organism. As a rule, the larger an animal, the longer it lives, and this, adds Minot, confirms the idea that in large animals senescence proceeds more slowly than in smaller ones. See SENESCENCE.

Growth is related to great *size.* The question why the elephant is so much larger than the mouse, the whale than the porpoise, cannot be answered at present; but from the foregoing statement the causes appear to be connected with nutrition and longevity as well as the conditions of the environment. Why the moa (*Dinornis*) or the æpyornis, whose legs were as thick as a man's hat, attained such a colossal size compared with the sparrow, is apparently due to its mode of life and its environment. Birds which have the full use of their wings and are constantly on the wing, live faster than running birds and are of small or moderate size. The ancestors of the running bird, as the ostrich and moa, were undoubtedly flying birds, with keeled sterna; but owing to the isolation of the moa on the New Zealand Islands, and to the absence of mammalian and other enemies, it is evident that by lack of exercise, by food being abundant in the soil, and by not being compelled to fly after their prey, they gradually increased in bulk and weight. Here we see a direct relation between the conditions of life and change of habits and size. Turtles are slow livers and are known to attain a very great age.

The matter of longevity and also of size may also be dependent on the nature of the cells. Minot states that the most characteristic peculiarity of advancing age, of increasing development, is the growth of protoplasm in proportion to the size of the nucleus. "The possession of a relatively large quantity of protoplasm is a sign of age"; i.e., the amount of protoplasm in the cell is large in maturity and old age as compared with the nucleus. He refers to Bütschli's investigations, which indicate that in bacteria a nucleus is present and very large, while the protoplasm enveloping it is minimal in amount. This fact should be correlated with the extraordinary power of proliferation or reproduction in these organisms, indicating that a small proportion of protoplasm is essential to rapid growth. This presence of a minimum amount of protoplasm is a "young" character, a characteristic of youth. Certain sea fishes, as also starfishes, continue to grow for very long periods, and their cells have the "young" character, containing very little protoplasm. On the other hand, there are certain types which do not grow beyond a definite size, and in these, as, e.g., among the insects, the cells are characterized by having a great deal of protoplasm in proportion to the nucleus. In this connection it should be remembered that May flies and dragon flies in the Carboniferous period were gigantic in size, their wings expanding from 10 to 20 inches, and throughout geological history we have cases of types becoming colossal before becoming extinct. Thus, overweight and oversize may be a sign of weakness and decrepitude—of senescence of the type. As the result of prolonged observation on guinea pigs, weighing them regularly at fixed ages from birth until maturity, Minot shows that even from the time of birth there is a steady loss of vitality; the animal begins, so to speak, to die as soon as it is born. The amount of protoplasm in the cells increases with age. This loss of growth power is equally demonstrated in the case of man and presumably of all mammals. The passage from youth to old age is called "senescence" (q.v.), and the procreation of the young "rejuvenation" (q.v.).

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GROWTH, IN PLANTS. Three ideas are involved in the term "growth" as applied to plants: first, increase in size; second, formation of new material; third, attainment of maturity. Of these three, increase in size is the predominant one; but in special cases of growth no appreciable increase in size occurs, although there may be the formation of new material and even, on attainment of maturity, a rather complex structure. Again, organisms may increase in size and attain mature form without the formation of any new living material, the whole course of development depending merely upon the absorption of water and the rearrangement of material already present. The plant passes through three phases of growth, which are by no means sharply distinguishable from one another and are established merely for convenience.

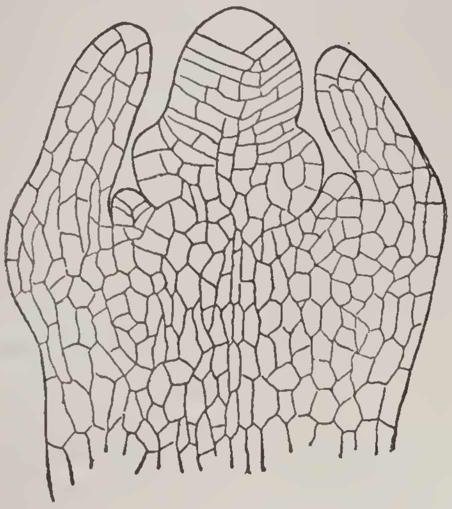


FIG. 1. Longitudinal section of the growing point of the shoot of horsetail (*Equisetum arvense*). The apex is occupied by a tetrahedral cell, which is continually dividing. Lateral leaves, and just above them the oldest lateral growing points, are forming.

The Formative, or Embryonal, Stage. Every plant begins its history as a single cell. The growth and differentiation of this one cell may comprise its whole life history, which will then be correspondingly brief; or, the first cell may divide, and its daughter cells continue dividing, until the plant is constructed of a mass of cells. These may remain practically alike, or they may differentiate into unlike groups of cells, each group constituting a tissue. (See HISTOLOGY.) In this case its life history will be more complex and will proceed as follows: at first the cells are all similar in size and form, and each will show these characteristics: (1) granular protoplasm without any water spaces (vacuoles); (2) a relatively large nucleus, its diameter often more than half that of the entire cell; and (3) a relatively thin wall surrounding the cell. Since this is the condition of the cells in every young (embryo) plant, and since in this condition cells are able to produce new cells by division and to give rise to new organs, this stage is named the embryonal, or formative, stage of growth. As the cells grow older, some or all of them pass by imperceptible degrees into the second and third phases of growth, while others remain in the formative stage. Those which persist in this stage are to be found at the ends of the axes, at which place they constitute the so-called growing point (Figs. 1, 2, 3). In the seed plants the tip of each rootlet and the tip of each branch is occupied by such a region of formative tissue. Even cells which have passed into a later stage of growth may return under certain conditions to the formative stage. This occurs normally in those stems which increase in thickness and form one or more growing zones concentric with the surface. A division of the cells in these zones is mainly in a plane parallel to the surface; the additions increase the diameter of the axes. When a plant is wounded, cells adjacent to those injured may regain their power of division and produce a callus, which closes and heals the wound.

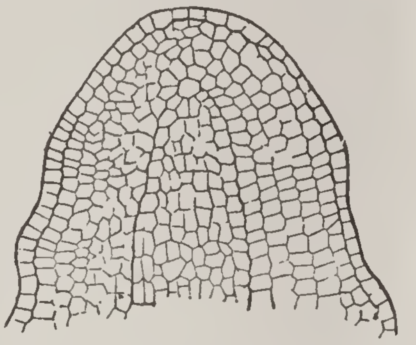


FIG. 2. Longitudinal section through the growing point of the shoot of a seedling dicotyl. A group of cells, instead of one as in *Equisetum* (Fig. 1), occupies the apex.

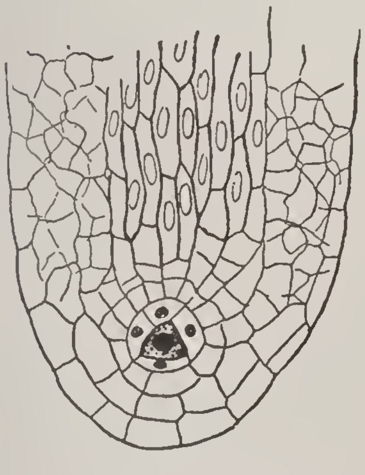


FIG. 3. Longitudinal section of growing point of root from *Selaginella*. The triangular cell near the tip is the apical cell, dividing continually to form (behind) the tissues of the root shaft and (before) the root cap.

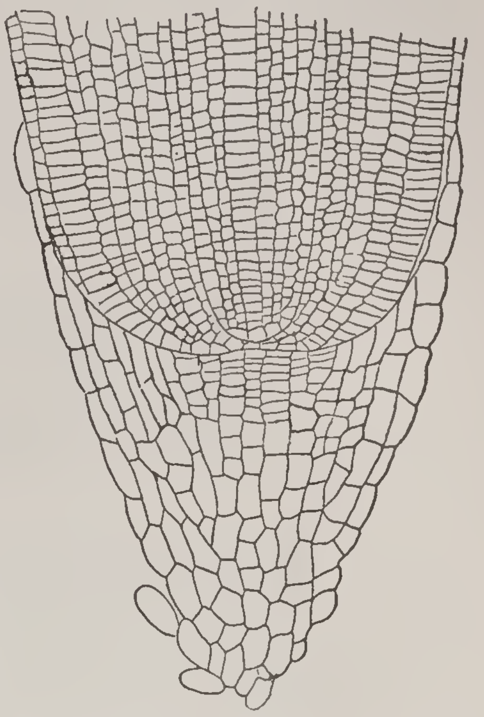


FIG. 4. Longitudinal section of growing point of root of corn (monocotyl). Apex (where cell rows converge) occupied by a group of cells, instead of one as in *Selaginella* (Fig. 3). The root cap is well developed.

Enlargement. In the second phase of growth, enlargement, division of the cells has practically ceased, and the greater part of the increase in size is due to the rapid absorption of water, which is secreted by the protoplasm in the form of drops in its substance. As these increase in number and volume, they often unite, and usually by the time increase in size has been completed all have united to form one large sap cavity (vacuole), in which the protoplasm constitutes a layer pressed firmly against the cell wall (Fig. 5). Since this mode of growth involves a relative unimportant increase in the amount of living protoplasm, it is extremely economical. In this feature the growth of plants differs most strikingly (in degree at least) from that of animals. During this second phase of growth the volume of the cells may increase

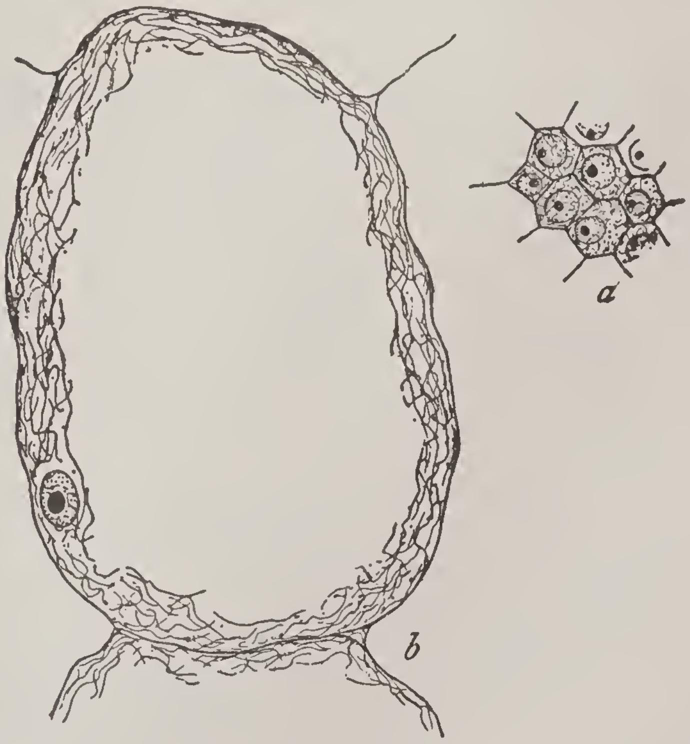


FIG. 5. *a*, several young cells from the cortex of a root of the bean; *b*, one from the same region after attaining its full size. Drawn to same scale. The volume of *b* is more than 1700 times that of *a*, though, as the wrinkling shows, it is not turgid.

1000 to 1500 fold. Characteristics of the cells in this phase are, therefore, (*a*) rapid increase in volume, and (*b*) high percentage of water. The rate of enlargement during this phase is not uniform; nor does it persist indefinitely, even though the conditions may be constantly favorable. The increase in volume, at first relatively slow, becomes more and more rapid until it attains a maximum rate, from which point it rapidly declines and soon ceases altogether. The total period of enlargement is spoken of as the grand period of growth (Fig. 6). It lasts in different plants from 5 to 15 days, depending on various factors which influence both duration and rate. Since the formative regions are located at the tips of the axes, the regions of enlargement may be found a short distance from the tip. In roots the elongating region is very short, comprising usually less than 10 millimeters (0.4 inch). In stems, however, the elongating region is usually from 10 to 20 centimeters in length (4 to 8 inches), and in climbers may even reach 50 to 80 centimeters (20 to 30 inches).

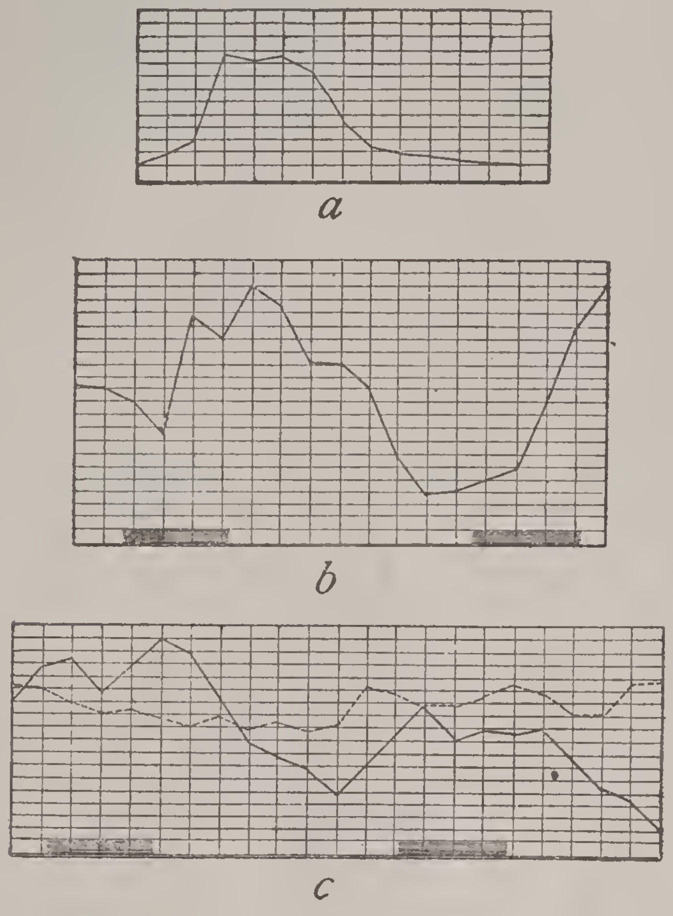


Fig. 6. DIAGRAM SHOWING PERIODIC VARIATIONS IN GROWTH.

The horizontal lines show equal increments of growth; the vertical lines equal intervals of time. *a*, grand period of growth in root of bean (*Vicia*); *b*, daily period of growth in stem of barley; *c*, daily period of stem of mustard (solid line) and of leaf of onion (broken line). In *b* and *c* the shaded bars represent hours of darkness.

The rate of enlargement (especially of elongation) is likely to be different on different sides of a bifacial or radial organ. In that case these organs will be correspondingly curved. The region elongating most rapidly will become convex and the opposite side concave. This curvature, which is determined by unknown, possibly internal, causes, is called nutation (q.v.). The curvatures of bifacial organs, which are also dorsiventral, are further distinguished by the terms "epinasty" and "hyponasty." An epinastic curvature is the effect of greater growth upon the dorsal side; a hyponastic curvature, upon the ventral side. Similar variations in growth are induced by the action of external agents; thus, epinasty produced by the action of the light is designated photoepinasty, etc. Nutation is exhibited by young leaves of ferns, which are rolled upon themselves in a coil and straighten as they grow older; by the leaves of buds and flowers, whose closed form (bud) is due to the more rapid growth of the outer faces and their "opening" to the more rapid growth of the inner faces. The rate of enlargement is affected in various ways by external stimuli (see Irritability), which will be considered later. Examples of very rapid growth are furnished by the filaments of the stamens of wheat, which elongate, as the flower opens, at the rate of 1.8 millimeters (0.07 inch) per minute (about the speed of the minute hand of a man's watch); by the leaf sheath of the banana, which grows at the rate of 1.1 millimeters (0.04 inch) per minute; by the flower axis of the century plant, which grows at the rate of 15 centimeters (6 inches) in 24 hours; and by the leaves of *Victoria regia*, which increase in diameter at the rate of 30 centimeters (12 inches) in 24 hours. The rate of growth is studied by means of the auxanometer (q.v.).

Internal Development. The third phase of growth is the phase of internal development. No increase in size occurs during this phase. It is marked by increase in thickness of the cell walls (unequal in different parts), by the death of some cells, and by other less noticeable changes. Since the growth of different groups of cells (tissues) is rarely equal, it follows that the tissues—some compressed, some stretched—firmly united as they are, finally exert strains upon one another in various directions, which serve an important purpose in maintaining the rigidity of the plant.

Factors on which Growth is Dependent. The conditions of growth are four: first, an adequate supply of constructive materials, which are necessary for the formation of a new organic substance, protoplasm, cell wall, etc.; second, an adequate supply of water, which is necessary for the enlargement of the cells; third, access of free oxygen, which is necessary for normal respiration, by which the requisite energy is set free; fourth, a temperature within definite limits, which, however, vary with different plants, the minimum being approximately 0° C. (32° F.), and the maximum 40° C. (104° F.).

The effects of external agents upon growth are numerous and profound. Scarcely any change in external conditions can occur without modifying the growth of the plant. These effects may be unequal in different tissues or in different parts of an organ, or they may be uniform, so that the total growth of the part is retarded or accelerated. The most noticeable effects, naturally, are those which produce curvature and consequent displacement of certain parts. (See under Chemotropism; Electrotropism; Geotropism in Plants; Heliotropism; Hydrotropism; Rheotropism; Thermotropism; Thigmotropism.) The most important effects upon the general rate of growth are those produced by temperature and light. In general, growth is accelerated by increased temperature up to the optimum point, but further increase beyond the optimum retards it. On the other hand, growth seems to be definitely retarded by light. Growth rate is also modified by turgor. In some forms maximum growth goes with maximum turgor, while in others maximum growth occurs when the turgor is slightly below the maximum. Since under ordinary conditions plants are subject to daily variations in temperature and light, there arises a corresponding daily variation, or "daily period," in the rate of growth (Fig. 6). Since the temperature rises during the day and diminishes during the night, the general effect will be to accelerate growth during the day and retard it during the night. Turgor is generally lowest during the day, owing to rapid evaporation. In different plants this may give a retardation or acceleration in growth rate. As light, however, retards growth during the day, the final effect will be a resultant between these three interacting factors, the effect of light as a rule predominating. It is also possible that food supply also sometimes enters in as a factor in the daily period. (See PHOTOSYNTHESIS.) The minimum usually occurs in the afternoon and the maximum after midnight, and this variation persists for many days, if plants be kept in continuous darkness.

Correlation. The growth of one part of the plant is directly affected by the activity of another. Thus, the failure of a certain organ to develop may determine the development of another to an unusual extent or in an unusual form. This mutual influence of plant organs, both as to their formation and the course of their development, is termed "correlation." Examples of correlation may be found in the development of the stipules of the pea and the pansy to an extraordinary size when the leaf blades are removed early; in the continued blossoming of plants when fruit is not permitted to form; in the symmetrical or grotesque shaping of a plant made possible by pruning; in the transformation of an underground branch of the potato, which would normally form a potato at its tip, into an aërial shoot bearing leaves and flowers when the aërial parts are cut away.

GRUB (connected with OHG. *grubilōn*, Ger. *grübbeln*, to dig, and Goth., OHG. *graban*, Ger. *graben*, AS. *grafan*, Eng. *grave*). The name commonly given to the larva of a coleopterous insect. Thus, the larvæ of the May beetles of the genus *Lachnosterna*, found commonly in the soil, are known as white grubs. The larvæ of certain flies (*Diptera*) are also called grubs, although the term "maggot" is now specifically applied to them. Thus, "grubby cattle" means, in the West, cattle affected by the ox bot, or ox warble, the larva of the dipterous insect *Hypoderma lineata*. The grub of sheep is also the larva of a fly (*Œstrus ovis*). See BEETLE; BOT; WARBLE FLY.

GRUBB, SIR HOWARD (1844–). An Irish astronomer and instrument maker. He was born in Dublin, Ireland, July 28, 1844, being the son of Thomas Grubb (q.v.), the famous optician, whose business he succeeded to in 1868. He was educated at Trinity College, Dublin. Under his direction the optical establishment founded by his father achieved increased reputation, and constructed a large number of telescopes, including those for the University of Oxford and the observatory at Potsdam. Sir Howard Grubb was knighted in 1887 and in 1912 received the Boyle medal. He was vice president of the Royal Society of Dublin, honorary secretary of the Royal Dublin Society, president of the Photographic Society of Ireland, and a member of the Board of Irish Lights Commissioners.

GRUBB, THOMAS (1800–78). A distinguished Irish optician. He was born at Kilkenny, Ireland, and in the course of his life constructed the equipment of some of the most important astronomical observatories. At an early age he gave up business for engineering and soon gained a high reputation as a maker of fine machinery and instruments, many of which were of his own invention. He also exhibited great skill as an optician, particularly in the construction and mounting of reflecting telescopes. He constructed the metallic speculum for the Melbourne Observatory reflector, which had a diameter of 4 feet and was used in making photographs of the moon. Grubb was elected a fellow of the Royal Society in 1864, the Royal Astronomical Society in 1870, and was for many years a member of the Royal Irish Society. To the journals of these societies he contributed papers on astronomical instruments and optics.

GRUB′BER. See CULTIVATOR.

GRÜBEL, grụ′bel, JOHANN KONRAD (1736–1809). A German folk poet, born at Nuremberg. He became known by his poems in the Nuremberg dialect, which first appeared under the title *Gedichte in Nürnberger Mundart* (3 vols., 1802). These poems reflect the life of the old German city and entitle Grübel to be ranked with such eminent dialect poets as Hebel, Groth, Reuter, and others. Another volume entitled *Korrespondenzen und Briefe in Nürnberger Mundart* appeared in 1808.

GRU′BER, HERMANN (1851–). An Austrian Jesuit author, born in Kufstein, Tirol. He was educated at the Stella Matutina in Feldkirch and at other Jesuit schools (Gorheim; Münster; Blyenbeck, Holland; Ditton Hall, near Liverpool; etc.), for a time taught at Mold, Wales, in a school founded by exiled French Jesuits, and in 1899 returned to Feldkirch. He wrote elaborately on various subjects of polemic interest in the publications of the Maria-Laach, in Herder's Catholic *Kirchenlexikon*, in the *Catholic Encyclopædia*, and in *Civilta Cattolica* (Rome), and published many books including *August Comte* (1889; trans. into French, Italian, and Polish), which was supplemented by *Der Positivismus, 1857–91* (1891), and several revelations of Freemasonry, such as *Mazzini, Freimaurerei und Weltrevolution* (1901; also in Italian).

GRUBER, gro͞o′bẽr, JOHANN GOTTFRIED (1774–1851). A German scholar, born at Naumburg. He studied at Leipzig, was employed for some time in editorial work on the *Literaturzeitung*, and held professorships of philosophy at Wittenberg and Halle successively. He was the author of a large number of works on historical and critical subjects. With Ersch, after the death of Hufeland, he edited the monumental *Allgemeine Encyklopädie der Wissenschaften und Künste*. Among his independent publications are: *Geschichte des menschlichen Geschlechts aus dem Gesichtspunkte der Humanität* (1806); *Wörterbuch der Aesthetik, der schönen Künste, etc.* (1810); *Wörterbuch der altklassischen Mythologie* (1810–15). He also edited Wieland's *Sämtliche Werke* (53 vols., 1818–28), to which he added a biography.

GRUB STREET. A London street, described by Dr. Johnson as "originally the name of a street near Moorfields, much inhabited by writers of small histories, dictionaries, and temporary poems, whence any mean production is called *Grub Street*." Employed in a disparaging sense by Andrew Marvell, it was frequently used by Pope, Swift, and other wits. The *Grub Street Journal*, which ended in 1737, was one of the most entertaining of the old newspapers and contained contributions from the partisans of Pope attacking the Dunces. The locality is now termed Milton Street. Consult F. H. Habben, *London Street Names: Their Origin, Significance, and Historic Value* (London, 1896), and A. S. Adcock, *A Booklover's London* (New York, 1913).

GRU'GRU (native name). The grub or larva of *Rhyncophorus palmarum*, an insect of the weevil family (Curculionidæ), inhabiting Guiana, Cuba, Porto Rico, and other tropical parts of America. The perfect insect is 1½ inches long. The grub is an ugly, inactive creature of a whitish cream color, as long and as thick as a man's thumb, and lives in the soft and spongy central part of the cabbage palm (*Euterpe oleracea*), on which it feeds. It is extremely fat and oily and is esteemed a great delicacy, not only by the Indians, but by many of the European colonists and their descendants, particularly the Dutch. It is cooked by roasting, and eaten with bread and butter, after being sprinkled with cayenne pepper. The fragrance of roasted grugru is said to be most tempting to epicures. A cabbage palm which has been cut down often becomes in a short time almost filled with grugrus; but they are usually obtained from the upper part of the stem of growing palms, near the crown.

GRUGRU PALM NUT. The nut of a number of species of *Acrocomia*, particularly of *Acrocomia lasiopatha* and *Acrocomia sclerocarpa*. These palms are natives of South America and the West Indies, growing 20 to 40 feet in height. The leaves are large and drooping. The fruit is about the size of an apricot, and it consists of a thin edible pulp and a hard nut, the kernel of which contains from 52 to 56 per cent of a white crystalline fat that resembles coconut and palm-nut oils. The trees annually bear 1 to 4 clusters of nuts, the bunches weighing about 10 pounds each. The nuts have been shipped to England for the extraction of the oil, and for several years the oil has been imported under the name "Mocaya oil." A valuable fibre is obtained from the leaves of many of the species of *Acrocomia*.

GRUIĆ, grōō'ĭch, Sava (1840–). A Servian statesman, born at Kolare. He was chief of the artillery division, under General Tchernayeff, in the Servian army during the war with Turkey in 1876. At the outbreak of the Russo-Turkish War of 1877 he was made Minister of War and afterward was sent to Bulgaria as the first diplomatic representative of Servia. In 1877 he returned to Belgrade and thereafter was twice Minister of War and three times President of the Ministry. He was Servian Ambassador at Constantinople from 1889 to 1893 and again from 1900 to 1903, and was Premier again from that year to December, 1904. He was the leader of the radical party, forced King Peter to grant many reforms, and took a prominent part in the formation of the Balkan Alliance.

GRUMBKOW, grụmp'kō̇, Friedrich Wilhelm von (1678–1739). A Prussian general and statesman, born in Berlin. He studied at Utrecht and Leyden from 1690 to 1693. He enjoyed the favor of Frederick William I, who employed him in both military and administrative matters. As the head of the War Department of Prussia, he increased and improved the army, and in civil capacity he introduced important tax reforms and considerably improved the administration of the municipalities. In his foreign policy he was not so fortunate, and his pro-Austrian leanings involved Prussia in numerous difficulties abroad.

GRUM'BLER, The. A comedy by Sir Charles Sedley, printed in 1702.

GRUMEN'TUM. An important town in ancient Italy, in Lucania (q.v.), 33 miles south of Potentia. In 215 B.C. Hanno, a Carthaginian general, was defeated near this town; Hannibal made it his headquarters in 207. Later, in Sulla's time, a Roman colony was established there. Ruins of a large amphitheatre, of a Roman theatre, of *thermæ*, and of a Roman portico have been found about ½ mile south of the modern Saponara. Inscriptions of some importance have also been found on this site. Consult Nissen, *Italische Landeskunden*, vol. ii (Berlin, 1902).

GRÜN, grụn, Anastasius. See Auersperg, A. A.

GRÜNBERG, grụn'bĕrk. Capital of the district of the same name in the Prussian Province of Silesia, on a tributary of the Oder, 32 miles northwest of Glogau (Map: Germany, F 3). It lies between two vine-clad hills and is noted chiefly for the sparkling wine which it has produced for centuries. Other products are cloth, thread, carpets, twine, glass, rope, yarn, paper, brandy, machinery, bridge materials, and flour. Lignite is mined. Pop., 1900, 20,983; 1910, 23,168.

GRUND, grụnt, Francis Joseph (1805–63). An American author, born in Bohemia. He came to the United States in 1826 and in 1854 was sent abroad to represent the United States in consular and diplomatic positions. He contributed frequently to the press and wrote a number of books, essays, and addresses, among them: *Americans in their Moral, Religious, and Social Relations* (1837); *Aristocracy in America* (1839); *Thoughts and Reflections on the Present Position of Europe and its Probable Consequences to the United States* (1860); and a campaign *Life of Gen. William Henry Harrison* (1840), written in German.

GRUND, Franz Friedrich Alexander (1814–92). A German engineer. He was born at Heinrichau, Silesia, and was educated at Breslau and Berlin. In 1854 he was appointed inspector of hydraulic engineering in the Rhine Province, and in 1862 he became advisory counselor in the Prussian Ministry. Among the hydraulic engineering works executed by him are those on the river Wupper and in Alsace-Lorraine. He also planned the Rhine-Meuse Canal, the harbors at Emmerich and Oberlahnstein (at the junction of the Lahn and Rhine rivers), and the extension of the harbor at Ruhrort, at the junction of the Ruhr and the Rhine. His memorial on the waterways of Alsace-Lorraine became the basis upon which the boundaries, as affecting rivers, canals, and so on, were subsequently determined in the annexed provinces.

GRUNDEMANN, grụn'de-mȧn, Reinhold (1836–). A German Protestant theologian, born in Bärwald, in the Neumark, Brandenburg. He studied at Tübingen, Halle, and Berlin, after which he occupied himself with pastoral duties from 1861 until 1865, when he devoted himself to the study of missions in England, Holland, and North America, concerning himself especially with their geographical aspects. As the result of his labors, he published *Allgemeiner Missions-Atlas* (1867–71, 1872, with maps), an amplification of his previous *Missionsweltkarte* (3d ed., 1886). In 1869 he was made pastor in Mörz, near Belzig. His works include: *Biographie des Missionärs J. F. Riedel* (1873); *Die Entwickelung der evangelischen Mission* (1878–88); *Missions-Studien und Kritiken in Verbindung mit einer Reise nach Indien* (2 vols., 1894–98); *Kleine Missions-Atlas* (1883; 3d ed., 1905).

GRUNDTVIG, grụnt′vĭg, Nikolai Frederik Severin (1783–1872). A Danish theologian, historian, and poet. He was born at Udby, Zealand, was educated at Copenhagen, was appointed pastor of Præstö, Zealand, in 1821, and in 1822 became assistant clergyman of the church of the Saviour at Copenhagen. He first attacked the ruling rationalism in his *Kirkens Gjenmæle* (1825), a work which aroused bitter controversy and caused him to be deprived of ecclesiastical office from 1826 to 1839. In 1861 he was appointed Bishop. He was a champion of religious and civic freedom and advocated the severance of church and state. His views led to the formation of a school which succeeded in getting many important reforms. In addition to his popular ballads and lyrics, he wrote the *Kort Begreb af Verdens Krönike i Sammenhæng* (1812), translations of Saxo Grammaticus, Snorri Sturluson, and of the Old English epic "Beowulf" (1818–22), and many polemical essays. He became a leader of the Danish party in the Diet and vigorously opposed German influence. After 1866 he became more conciliatory towards Prussia. He is best known by his *Northern Mythology* (1832) and *Salmer og aandelige Sange* (5 vols., 1873–81). He was one of the foremost hymnologists in Danish literature. Consult Hansen, *Wesen und Bedeutung des Grundtvigianismus* (Kiel, 1863).

GRUNDTVIG, Svend Hersleb (1824–83). A Danish philologist, born in Copenhagen, Sept. 9, 1824, son of the preceding. His early education was conducted wholly by his father, who disapproved of the prevailing methods in Denmark at that time. The study of Greek, Danish, Old Norse, and English preceded that of Latin, and the father's enthusiasm for Danish ballads turned the son's attention at a very early age in that direction. Grundtvig's name is now especially associated with the ballad literature of his native land. His first important publication was his annotated translations of English and Scottish ballads (1842–46). In 1853 the first volume of his *Danmarks gamle Folkeviser* appeared, the fourth and last volume being published soon after his death in 1883. In 1882 he published a selection of these ballads in one volume. Grundtvig's position among Danish philologists is of the highest, in the same class with Rask and Madvig. In 1863 he was appointed docent in Scandinavian philology at the University of Copenhagen, and full professor in 1869. He died July 14, 1883.

GRUN′DY, Felix (1777–1840). An American lawyer and politician, born in Berkeley Co., W. Va. In 1779 his father removed with his family to western Pennsylvania and in the following year to Kentucky, where Felix, one of seven brothers, was brought up amid the perils and privations of a frontier life. He was educated at Dr. Priestley's academy at Bardstown and studied law. In 1799 he became a member of the Kentucky Legislature, where he met Henry Clay in debate, but resigned in 1806 to accept an appointment as judge in the Supreme Court of Errors and Appeals. The next year he became Chief Justice, but, owing to the insufficiency of the salary, resigned from the bench in 1808 and settled in Nashville, Tenn., where he achieved a wide reputation as a criminal lawyer. In 1811 and 1813 he was elected, as a Democrat, to Congress, and in 1819 was a member of the Tennessee Legislature, where he successfully advocated the establishment of a State bank. In 1829 he was elected to the United States Senate, to fill the unexpired term of James H. Eaton, who had entered Jackson's cabinet as Secretary of War, and in 1832 was reëlected for a full term. In the Senate he was chairman of the Judiciary Committee and was a strong advocate of most of Jackson's measures, although he maintained a somewhat neutral position in the Nullification controversy. He was a consistent opponent of Clay's "American policy" and of the United States Bank. In September, 1838, he entered Van Buren's cabinet as Attorney-General, but held office only until December, 1839, when he resigned to enter the Senate again, serving therein until his death, which followed an electioneering tour in behalf of Van Buren's reëlection in the fall of 1840.

GRUNDY, Mrs. A very censorious person, to whom Dame Ashfield, in Morton's play of *Speed the Plough*, often refers in the expression, "What will Mrs. Grundy say?" but who does not appear among the *dramatis personæ*. Mrs. Grundy is accepted now as the embodiment of that censorious part of society which is governed by narrow, conventional views of morality and propriety.

GRUNDY, Sydney (1848–1914). An English dramatist, born in Manchester. He was educated at Owens College and was called to the bar in 1869, but after 1872 devoted himself to the writing of plays and comic operas. Among them are: *A Little Change* (1872); *In Honor Bound* (1880); *A Pair of Spectacles* (1890); *Sowing the Wind* (1893); *The New Woman* (1894); *The Greatest of These* (1895); *A Bunch of Violets* (1894); *The Silver Key* (1897); *The Degenerates* (1899); *Frocks and Frills* (1902); *The Garden of Lies* (1904); *The Diplomatists* (1905); *A Fearful Joy* (1908).

GRUNER, grōō′nẽr, Justus von (1777–1820). A Prussian statesman. He was born at Osnabrück and was educated in law at Halle and Göttingen. In 1809 he was appointed president of the police department of Berlin, where he introduced so admirable an organization that two years later he was advanced to the command of the entire police force of Prussia. In this position he displayed great shrewdness in circumventing the French method of espionage at work throughout the kingdom. After the conclusion of the Prussian alliance with France, Gruner, who was an implacable enemy of Napoleon, tendered his resignation and subsequently was intrusted in Prague with the organization of the national defense in Germany, planned by Baron von Stein. He was arrested in 1812, by order of the Austrian cabinet, which had determined on the measure in order to rescue him from capture at the hands of the secret police of France, who had traced his movements. In 1814 he was made Governor-General of Berg and in the following year was appointed chief of the German police in Paris during the occupation of that city by the allies. During the last four years of his life he was Prussian Ambassador to Switzerland. As Governor-General of Berg and of the Middle Rhine, he organized the patriotic rising against Napoleon, issuing proclamations and traveling from place to place in order to arouse the people. It was he also who succeeded, while chief of the German police in Paris, in obtaining the restoration of the art treasures seized by the French during their occupation of German territory. In 1815, instead of entering the State Department at home, he accepted the position of Ambassador to Switzerland.

GRUNER, (Wilhelm Heinrich) Ludwig (1801–82). A German line engraver, born in Dresden. He was a pupil of Klingen and Krüger in Dresden, and he also studied under Longhi and Anderloni in Milan. From 1837 till 1841 he resided in Rome, where he engraved the mosaics of the Chigi Chapel, published in 1839. In 1842 he went to England, where he remained until 1856. While in England he engraved *Decorations of the Garden Pavilion of Buckingham Palace* (1846) and *Specimens of Ornamental Art* (1850), ordered by the British government. His sight being for a time affected, he devoted himself to fresco painting, and he had a share in the decorations of the Crystal Palace, London, Osborne House, and Buckingham Palace. In 1856 Gruner was called to be director of the Cabinet of Engraving in Dresden, where he remained until his death. While there, he published a series on the *Cathedral of Orvieto* (1858); *Luini's Decorations of Santa Maria delle Grazie, Milan* (1859–60); *Das Grüne Gewölbe zu Dresden* (1862); and his *Terra-Cotta Architecture of Northern Italy* (1867). He also engraved a number of special plates, especially after Raphael and Overbeck.

GRUNERT, grōō′nĕrt, Julius Theodor (1809–89). A German forester, born and educated at Halle. He was appointed assessor of forests for the Prussian government at Königsberg in 1839, and thereafter held important positions under the government at Danzig and other cities of Prussia, and was also in 1859–66 director of the Academy of Forestry at Eberswalde. His last appointment was at Treves, where he was chief forester from 1866 until his retirement in 1878. He was founder and editor of the *Forstliche Blätter* (established 1861) and wrote the works entitled *Der preussische Förster* (1869; 2d ed., 1883), *Forstlehre* (1875; 4th ed., 1884), and *Die Jagdgesetzgebung preussens* (1886).

GRÜNEWALD, grụ′ne-vält, Matthias (?–c.1529). A German painter of the Renaissance, one of its most important masters. The date of his birth cannot be established; but he was born probably at Aschaffenburg, where a painter by this name is recorded in the public documents. Our meagre knowledge of his life is due chiefly to Sandraart (the German Vasari), who relates that Grünewald practiced at Mainz, where he lived a retired and melancholy life and was unhappily married. From him we know also that he was patronized by Cardinal Albrecht of Brandenburg, Archbishop of Mainz, and important paintings by him were in Mainz Cathedral. It is not known from whom he derived his artistic training; but he belonged to the Franconian school of the middle Rhine, and was certainly influenced by the work of Schongauer. His art is strikingly original and unlike anything that preceded. A very marked characteristic is the heavy contrast of light and shade, for which Sandraart long ago called him "the German Correggio"; another is his powerful and poignant realism. His point of view is pictorial, and his works show lack of anatomical study and deficiency in line. The color is powerful, sometimes harsh. In emotional expression he is second to no painter of the century.

Among Grünewald's earliest-known paintings are "Christ Mocked" (Pinakothek, Munich), recognized as his work in 1909, and a "Crucifixion" (Basel Museum). He painted also, in gray monochrome, the exterior of Dürer's well-known "Heller Altarpiece," with "Saints Cyriacus and Laurence," now preserved in Städel Institute, Frankfort. By far his most important achievement is the remarkable Isenheim altar, painted before 1519 for the priory of the Antonites in that town. It was one of those richly decorated late German altars, the effect of which depends largely upon the Gothic architectural surroundings, and in its original condition it was the most imposing work of the kind in Germany. All of its painted parts and much of the sculpture survive in the museum of Colmar. When closed, the altar presented a panel of the "Crucifixion, with the Virgin, the Magdalen, and the Baptist," of grandiose and almost repellent naturalism; on either side were the figures of "Saints Antonius and Sebastian." When the first pair of wings was opened, the central panel depicted the "Madonna and Child" in a wondrous landscape, adored by angels singing and making music; the left wing was an "Annunciation," the right a very original "Ascension of Christ." The interior of the altar revealed a series of polychrome wooden sculptures, dominated by "St. Anthony," and flanked by painted wings representing, with grotesque originality, "Saints Anthony and Paul" and the "Temptation of St. Anthony." On the predella was a "Bewailing of the Body of Christ." Soon after 1519 he painted for the church at Aschaffenburg the altar of "Our Lady of the Snow," recently discovered in the church of Stuppach, together with the "Founding of Santa Maria Maggiore." Another "Crucifixion" of powerful realism is in the Karlsruhe Gallery—on the obverse Christ sinks beneath the cross; and in the Pinakothek, Munich, is the central panel of an altarpiece representing Saints Erasmus and Mauritius.

Bibliography. A descriptive bibliography of the literature on Grünewald appeared in *Repertorium für Kunstwissenschaft*, vol. xxiii (Berlin, 1910). The two principal monographs are Boch, *Die Werke des Matthias Grünewald* (Strassburg, 1904), and Josten, in *Künstler Monographien* (Bielefeld, 1913).

GRÜNHAGEN, grụn′hä-gen, Kolmar (1828–1911). A German historian, born in Trebnitz, near Breslau, and educated at Jena, Berlin, and Breslau, where in 1855 he was made instructor in history and from 1866 to 1901 was professor. He edited the *Zeitschrift des Vereins für Geschichte und Altertum Schlesiens* (1862 et seq.) and was long head of the governmental archives in Breslau. He wrote much on the history of Silesia: *Breslau unter den Piasten als deutsches Gemeinwesen* (1861); *Friedrich der Grosse und die Breslauer, 1740–41* (1864); *Die Hussitenkämpfe der Schlesier* (1872); *Geschichte Schlesiens* (1884–86); *Schlesien unter Friedrich dem Grossen* (1890–92). Grünhagen published many valuable documents, especially from the Middle Ages, bearing on the history of this province.

GRÜNINGER, grụ′nĭng-ẽr, Johann, also known as Johann Reinhart von Grüningen (c.1450–?). A German printer. He became a master in Basel in 1480 and in 1482 was made a burgher of Strassburg, where between 1483 and 1529 he printed about 250 works, many of them illustrated with wood engravings, but full of errors. At the beginning of the Reformation in Strassburg he published a number of Catholic polemic treatises.

GRUNT. A name commonly used by fishermen for various species of the drum (q.v.), especially the fresh-water species (*Haplodinotus grunniens*). It refers, like "croaker" and other names, to the vibratory "grunting" sounds made by these fishes.

GRUPPE, gro͞op′pe, Otto (1851–). A German classical scholar, son of Otto Friedrich Gruppe. He was born in Berlin, was educated there, and in 1876 became teacher in a Gymnasium there. He wrote reviews of books on classical mythology in Bursian's *Jahresbericht,* and published the valuable "Griechische Kulte und Mythologie," in *Beziehung zu den orientalischen Religionen* (1887), and *Griechische Mythologie und Religionsgeschichte* (1902–06).

GRUPPE, Otto Friedrich (1804–76). A German scholar and author, born at Danzig and educated at Berlin. His opposition to the then prevailing Hegelian philosophy was so strong that he was not allowed to qualify as a docent. He became a journalist, wrote for the *Preussische Staatszeitung,* and became its editor in 1835. Seven years later he was appointed to a position in the Ministry of Education and in 1844 he became professor of the philosophic faculty in Berlin. His philosophic work is contained in *Antäus* (1831), *Wendepunkt der Philosophie im 19. Jahrhundert* (1834), and *Gegenwart und Zukunft der Philosophie in Deutschland* (1855), all anti-Hegelian. He was a classical scholar of much ability and wrote: *Die kosmischen Systeme der Griechen* (1851); *Ariadne,* on Greek tragedy (1834); the valuable work *Die römische Elegie* (1838); and *Minos* (1859) and *Æakus* (1872), in which he discussed interpolation in the Roman poets of the Augustan age. His other works include epics, lyrics, and dramas, now little read, two or three anthologies, and the critical works *Leben und Werke deutscher Dichter* (5 vols., 1864–72) and *Reinhold Lenz, Leben und Werke* (1861).

GRUSCHA, gro͞o′shȧ, Anton Joseph (1820–1911). A Roman Catholic prelate. He was born in Vienna and in 1843 was made a priest. In 1851 he was appointed professor of religion in the Theresianum and in 1855 preacher in the cathedral of St. Stephen in Vienna. After that his rise was rapid, and he was appointed in succession to the offices of Privy Chamberlain of the Pope (1858), professor in the University of Vienna (1863), canon of St. Stephen's (1871), Apostolic Field Vicar of the Army, and Bishop of Karrhä in partibus (1878); Archbishop of Vienna (1890), and Cardinal (1891). He contributed frequently to Catholic periodicals and published a *Handbuch der katholischen Religionslehre für höhere Lehranstalten* (1851).

GRU′SIA. See Georgia.

GRUSIN′IAN. A name used by some ethnologists to designate the Georgian peoples of the Caucasus. It is derived from *Grusia,* the Russian name of Georgia. See Georgian.

GRUSON, gro͞o′zōn, Hermann (1821–95). A German inventor and ironmaster, born at Magdeburg and educated at Berlin. After working in the Borsig locomotive works, he was mechanic on the Berlin-Hamburg road (1845); then was chief engineer of the Wöhlert machine shop in Berlin (1851), and in 1855, after serving for a year as manager of a steamship company at Buckau, set up a shipyard of his own and an iron foundry. The result of his experiments here was the invention of a process for chilled cast iron (see Armor Plate), which found many uses in industrial machinery as well as for armor and shells. The metal, sometimes called "Gruson metal," is used also in the manufacture of the Gruson rapid-fire gun and the Gruson anchor. In 1886 his establishment was incorporated with Gruson as manager. He retired in 1891, and in 1893 the works were bought by the firm of Krupp (q.v.). Gruson wrote studies in physics under the title *Im Reiche des Lichts* (2d ed., 1895).

GRUTER, grụ′tẽr, or **GRUYTÈRE,** grụ-ē̇-târ′, Jan (1560–1627). A Belgian classical scholar, born at Antwerp. After studying at the universities of Cambridge and Leyden he held various professorships until 1592, when he was made professor of history at the University of Heidelberg. In 1602 he became librarian of that university, but during the siege by Tilly in 1622 the valuable Palatine collection of books, of which he was keeper, was sent to Rome, together with his own private library. He published editions of many of the Latin classics, but is remembered chiefly for his *Lampas sive Fax Artium Liberalium* (7 vols., 1602–34), a collection of the best critical and antiquarian treatises of the sixteenth century, and his masterpiece, *Inscriptiones Antiquæ Totius Orbis Romanorum* (2 vols., 1603; ed. by Gudius, Grävius, and Burmann, 4 vols., 1707), to which Joseph Scaliger (1540–1609) wrote a valuable index. Consult Hulst, *Jean Gruytère* (Liége, 1847), and Sandys, *A History of Classical Scholarship,* vol. ii (Cambridge, 1908).

GRÜTLI, grụt′lē̇, or **RÜTLI.** A meadow in the Canton of Uri, Switzerland, occupying the western shore of the Lake of Uri, the southern portion of the Lake of Lucerne. It is regarded as the cradle of Swiss liberty, tradition designating it as the place where on Nov. 8, 1307, Erny Anderhalden of Melchthal, Fürst, and Stauffacher planned the revolt against Austria which resulted in the independence of Switzerland. The tract was purchased in 1859 by the school children of Switzerland to be preserved as national property. A monument commemorating the event was erected there in 1884.

GRÜTZMACHER, grụts′mäk-ẽr, Friedrich (1832–1903). A celebrated German violoncellist, born at Dessau. He received his first musical instruction from his father and then studied the cello under K. Drechsler and composition under F. Schneider. While a member of a small orchestra in Leipzig, he attracted the attention of Ferdinand David, who brought about his appointment in 1849 as first cellist of the famous Gewandhaus Orchestra. From 1860 till his death he filled the same position in the Royal Court Orchestra in Dresden. He was one of the most renowned teachers of his time, and not only a very prolific, but also a much esteemed, composer for his instrument.

GRÜTZNER, grụts′nẽr, Eduard (1846–). A German genre painter. He was born at Gross-Karlowitz and was a pupil at the Munich Academy and afterward of Piloty, whom he assisted in teaching. He is principally known through his pictures of humorous scenes from

Shakespeare and his humorous genre subjects from monastic life. Among the former are scenes from *Henry IV, The Merry Wives of Windsor, As You Like It, The Taming of the Shrew;* such pictures as "Falstaff at the Inn" (1869), "Falstaff and his Companions in the Wood" (1870), "Falstaff in the Dirty Linen." His monastic subjects include "In the Convent Cellar," "Testing Wine," "Convent Brewery," "Capuchin Mending his Cowl," "Monastic Hospitality," "Siesta in the Convent." He is represented in the Pinakothek by "The Silesian Drinker and the Devil," "Convent Peace," and "Don Quixote"; at Dresden by "The Convent Library"; at Königsberg by "The Convent Kitchen"; at Breslau by a series of cartoons entitled "Falstaffiade," and in other German museums. Grützner's art is literary rather than pictorial. He characterizes well, and his humor is contagious.

GRUYÈRES, grṳ'yâr'. A town of Switzerland, situated 16 miles southwest of Fribourg (Map: Switzerland, B 2). It has an old tenth-century castle of the former counts of Gruyères and is a centre for the celebrated Gruyère, or Swiss, cheese. Pop., 1900, 1375; 1910, 1389.

GRUYTÈRE, grṳ-ė-târ', JAN. See GRUTER.

GRYL'LIDÆ (Neo-Lat., nom. pl., from Lat. *gryllus, grillus,* cricket). A family of insects of the order Orthoptera, including those forms known as crickets. It comprises three distinct groups—the true crickets, typified by the common field cricket, the tree cricket, and the mole crickets. See CRICKET.

GRYPHÆ'A (Neo-Lat., from Lat. *gryphus, gryps,* Gk. γρύψ, griffin, from γρυπός, *grypos,* hook-nosed). A pelecypod genus of the family Ostreidæ, found fossil in, and very characteristic of, Mesozoic rocks. The shell has little resemblance in form to the majority of pelecypods, for it is very unsymmetrical, the left valve being much enlarged and strongly arcuate with underturned beak, while the right valve is small, flat, and lidlike. The best-known species are *Gryphæa areuata* of the European Lias and *Gryphæa vesicularis* of the Cretaceous of both North America and Europe. At some Cretaceous localities in the United States *Gryphæa* shells have been washed out of the soft deposits in which they were entombed and now lie scattered on the surface of the ground in great numbers. See EXOGYRA.

GRYPHIUS, grĭf'ĭ-ŭs, *Ger. pron.* grẽ'fē-ṳs, ANDREAS (1616–64). A German dramatic poet, whose real name was Greif. He was born at Grossglogau and passed a sad youth. He studied at Leyden, where he also lectured on a multitude of subjects, traveled in France and Italy, and, after refusing calls to professorships in Frankfort-on-the-Oder, Upsala, and Heidelberg, was appointed Syndic of the Principality of Glogau. The struggles of his youth and the envy of later years, as well as physical weakness, made his lyrics sombre and his epigrams sharp. But his dramatic work, which is more important, suffers little from his own experience of the tragedy of life; and the tragedies *Leo Armenius* (1646), *Katharina von Georgien* (1647), *Cardenio und Celinde,* and *Papinianus,* though marred by imitations of Seneca and of his own contemporary, Vondel, and though veritable cabinets of horror, show considerable power, though little action. His comedies are much better. *Peter Squentz,* or *Absurda Comica* (c.1650), is based on the main episodes of the *Midsummer Night's Dream; Horribilicribrifax,* of about the same date, has much the same motive as Plautus's *Miles Gloriosus,* save that it adds a pedantic scholar, besides a braggart captain; and *Das verliebte Gespenste* (1660) and *Die geliebte Dornrose* (the best German comedy before Lessing), written in the dialect of Silesia, are full of humor. The latter play is curiously incorporated in the former. Several of his plays and lyrics have been reprinted in recent times. His hymn *Vanitas vanitatum, vanitas* is widely known. Gryphius also translated many Dutch, Italian, and French plays; wrote an epic in Latin, and was considered a marvel of learning, as he knew 11 languages and lectured on logic, anatomy, geography, history, mathematics, astronomy, and Roman antiquities. A fairly complete edition of his works is that published at Breslau (1657–63); also an edition of his dramas and lyrics, edited by H. Palm, in three volumes, in the publications of the *Stuttgarter litterarischen Vereins* (1879–85). Consult Hermann, *Ueber Andreas Gryphius* (Leipzig, 1851); Klopp, *Andreas Gryphius als Dramatiker* (Osnabrück, 1852); Wysocki, *Andreas Gryphius et la tragédie allcmande au XVIIème sièele* (Paris, 1893); Manheimer, *Die Lyrik des Andreas Gryphius* (Berlin, 1904).

GRYPHIUS (properly GREYFF), SEBASTIAN (1493–1556). A German printer, born at Reutlingen, and a brother of Franz Greyff, who published at Paris a *Lexicon Græeo-Latinum.* Sebastian went to Lyons before 1524 and printed there more than 300 titles in Hebrew, Greek, and Latin, but very few in French. The best known among his books are a Latin Bible of 1550, in unusually large type, and a *Thesaurus Linguæ Sanetæ,* by Sanctus Pagninus (1529). His son ANTOINE carried on his father's business for a time in Lyons.

GRYPHON, grĭf'ŏn (archaic form of *griffin*). A fabled monster with the head of an eagle and the lower part of a lion. See GRIFFIN.

GRYSBOK, grīs'bŏk (Dutch *grijsbok,* from *grijs,* gray + *bok,* buck). A small chocolate-red antelope (*Nanotragus,* or *Rhaphiceros, melanotis*), one of the steinboks (q.v.), now met with only in the hilly country north and west of the Limpopo River. Cf. ORIBI.

GUACA, gwä'kȧ, or **HUACA**, hwä'kȧ. See PERUVIAN ARCHÆOLOGY.

GUACAMAIA, gwä'kȧ-mī'ȧ. A West Indian parrot fish (q.v.).

GUACHARO, gwȧ-chä'rō, OIL BIRD, or FAT BIRD. A curious bird of northern South America, which has many resemblances to the nightjars, but is now regarded as constituting a separate family, the Steatornithidæ. Its specific name is *Steatornis caripensis,* in allusion to the valley of Caripe (q.v.), where it was first obtained by Humboldt and Bonpland. It is the sole representative not only of its genus and family, but of the suborder Steatornithes. It is about the size of a crow, much resembles a nightjar in form and plumage, and is wholly nocturnal, spending the day in vast numbers in deep and dark caverns. At night the birds come forth, chattering with a queer clicking note, and search the forests for food, which consists of oily nuts and fruits. The hard, indigestible seeds swallowed by the guacharos accumulate on the floor of their caves in great quantities, and many of them sprout and grow in pale, colorless forms of plants, which form a most singular part of the scenery of the caverns. The bird is said to make a bowl-like nest of clay, in which are laid two to four white eggs. The young are extremely fat and are gathered by the Indians and used by many white persons as food, but more extensively as the source of a clear and very useful oil, which is tried out of their bodies. The guacharo inhabits Trinidad and neighboring islands and various inland parts of Venezuela and Ecuador. Consult Newton, *Dictionary of Birds* (New York, 1893–96), where many further references will be found. See Plate of NIGHTJARS, ETC.

GUACHOS, gwä'chōz. See GAUCHOS.

GUACO, gwä'kȯ (South American name). A Peruvian medicinal plant. See EUPATORIUM.

GUADALAJARA, gwä'dȧ-lȧ-ʜä'rȧ (Lat. *Arriaca*). Capital of the Spanish province of the same name, situated 2100 feet above sea level, on the left bank of the Henares, 35 miles by rail northeast of Madrid (Map: Spain, D 2). It is an ill-built town, and many of its old buildings have fallen into ruin. The chief of these are the palace of the Mendozas, the feudal lords of Guadalajara; the *Panteón*, or mausoleum, in which they are buried; the cloister of San Francisco, now a fort; the Gothic-Arabian palace of the dukes of the Infantado; and the Roman bridge and aqueduct across the Henares. There are also several notable churches, a school of military engineering, the provincial institute, museum, and library, installed in an old cloth factory. A military aërodrome was established in 1911. Soap, leather, woolen goods, and bricks are manufactured, and there is a good trade in farm products. Guadalajara fell into the hands of the Moors in 714, but became a possession of Castile in 1081. Pop., 1900, 10,944; 1910, 12,176. The province has an area of 4676 square miles and its population in 1910 was 208,447.

GUADALAJARA. The capital of the State of Jalisco, Mexico, situated near the Río Grande de Santiago, 3600 feet above sea level (Map: Mexico, G 7). The surrounding district is fertile and rich in silver mines, and the city itself is well built, with straight, well-paved streets, and many large squares, being the second city in the country in size and importance. The chief buildings are the cathedral, dating from 1618, which has a magnificent interior and contains a beautiful painting by Murillo; the university, the government building, episcopal palace, theological seminary, high school, and art academy. The city has also a public library of 24,000 volumes, a botanical garden, and a number of scientific and literary institutions, as well as several fine theatres. The numerous convents rent their arcades to shopkeepers. The water supply is derived from the many springs near the city and is brought by an aqueduct 8 miles long. The city has electric lights and street railways. It also has cotton and flour mills, tile works, a tannery, and a shoe factory, and carries on an active trade in machinery. It is the residence of a United States consul, and imports large quantities of manufactured goods from the United States. Pop., 1910, 118,799. Guadalajara was founded in 1530. On July 30, 1912, an earthquake visited the district, and 10,000 people were rendered homeless. The city was captured from the Federals by the Constitutionalist forces in July, 1914.

GUADALAVIAR, gwä'ᴅȧ-lä'vē̇-är' (Ar. *wād al-abyad*, white river). A river of east Spain, rising in the Sierra de Gúdar, in the Province of Teruel, and flowing in a south and southeast direction through the Province of Valencia (Map: Spain, E 3). It falls into the Mediterranean at the town of Valencia. Length, about 150 miles. In one place the river passes through a defile or cañon, only 50 feet wide, with perpendicular rocky sides 450 feet high, and the romantic scenery along its banks has been celebrated by many poets. Near its mouth the waters of the Guadalaviar are led off into numerous canals, irrigating the plain around Valencia, and a large part of it serves as the water supply of the city.

GUADALCÁZAR, gwä'dȧl-kä'sär. A town in the Province of San Luis Potosí, Mexico, situated in an arid region about 40 miles northeast of the city of San Luis Potosí (Map: Mexico, J 6). It is important because of its mines of quicksilver. Pop., about 8000.

GUADALCÁZAR, MARQUIS OF. See FERNÁNDEZ DE CÓRDOBA.

GUADALQUIVIR, ga̤'dȧl-kwĭv'ẽr, *Sp. pron.* gwä'ᴅȧl-kē̇-vēr' (Ar. *wād al-kebīr*, great river). Next to the Ebro, the most important river of Spain. It rises in the Sierra de Pozo, in the eastern part of the Province of Jaén, and, after pursuing for a short distance a northeasterly course between that range and the Sierra de Cazoila, makes an abrupt bend and flows in a generally west and southwest direction through the provinces of Jaén, Cordova, and Seville, emptying into the Atlantic Ocean 20 miles northwest of Cadiz, after a course of 350 miles (Map: Spain, C 4). Its upper valley is irregular and mountainous, but through the greater part of its course it flows through a wide and level plain, somewhat resembling the pampas of Argentina. Here the river runs sluggishly, and for the last 70 miles of its course, as far as Seville, it is a tidal stream. Below Seville it divides twice, forming two large islands, called Isla Mayor and Isla Menor. At high water it often overflows its banks, and the whole region around its mouth is known as *Las Marismas*, or tidal marshes. The principal tributary is the Jenil, from the south. The middle valley is very fertile and contains, besides the cities of Cordova and Seville, on the banks of the river, numerous towns and villages. The river flows at all seasons with a full stream, being fed by the winter rains and the melting snow from the Sierra Nevada in summer. The river, though navigable to Seville for ships of 1200 tons, is not much used as a waterway, and the channel is not kept free from silt. The Guadalquivir figures largely in the legends, poetry, and history of Spain. It is the Bætis of the Romans. Consult E. Slater, *Along Spain's River of Romance* (New York, 1912), and P. Gwynne, *The Guadalquivir: Its Personality, its People, and its Associations* (London, 1912).

GUADALQUIVIR, MARQUIS DE LAS MARISMAS DEL. See AGUADO, ALEJANDRO MARÍA.

GUADALUPE HIDALGO, ga̤'dȧ-lo͞op' hē̇-dȧl'gȯ *or* ē̇-ᴅäl'gȯ, TREATY OF. A treaty made between the United States and Mexico, at Guadalupe Hidalgo, a small place in the outskirts of the city of Mexico, Feb. 2, 1848, at the close of the Mexican War. The American negotiator was Nicholas P. Trist, of Virginia, chief clerk of the Department of State, who had been sent by President Polk, in the spring of 1847, to the headquarters of General Scott for the purpose of entering into negotiations with the Mexican government. At that time Trist was instructed to demand, among other things, the cession of New Mexico and the Californias and the recognition of the Rio Grande as the international boundary. During an armistice, in the month of August, commissioners of the Mexican government met Trist and offered radically different counterpropositions, insisting also upon the Nueces as the correct boundary. Nothing came of these negotiations, and, upon the termination of the armistice, hostilities were resumed, and Trist was recalled. Nevertheless, he remained on the ground, and, upon a suitable change in the military situation, negotiations were resumed in January, 1848, and on February 2 an agreement was reached in the Treaty of Guadalupe Hidalgo. Trist promptly returned to Washington, and President Polk submitted the treaty to the Senate on February 23. After vigorous opposition on the part of some of the senators, resulting in modifications which were accepted by Mexico, the treaty was ratified by the Senate on March 10; ratifications were exchanged on May 30, and the treaty was proclaimed on July 4, 1848. By the terms of the treaty in its final form the Rio Grande was established as the boundary for the eastern portion of the cession, and in the west the lines of the Gila and Colorado were so followed as to give to the United States all the territory then known as New Mexico and Upper California. The United States agreed to pay to Mexico $15,000,000 and to assume the payment of all claims adjudged against Mexico under the conventions of 1839 and 1843. Furthermore, the United States assumed the payment of all claims, not exceeding in the aggregate $3,250,000, held by citizens of the United States against Mexico, which originated prior to the date of the treaty. On July 29, 1848, Congress passed an act providing for the payment of the claims already liquidated, and on March 3, 1849, a commission was created to pass upon claims against Mexico held by citizens of the United States. By this commission 182 claims were allowed and 70 were rejected. For a map illustrating the cession, consult Channing, *United States of America*, (New York, 1896).

GUADALUPE (ga̤'dȧ-lo͞op') **MOUNTAINS.** A mountain range between the Rio Grande and the Pecos River in Texas and New Mexico. It has a northwesterly trend and may be considered as a southern continuation of the Rocky Mountains. The range has a maximum elevation of 5000 to 6000 feet above sea level.

GUADALUPE (ga̤'dȧ-lo͞op') **RIVER.** A river of Texas. It rises in Kerr County, in the southwest-central part of the State, and flows southeast through pleasantly undulating prairie and forest regions past the towns of New Braunfels, Seguin, Gonzales, Cuero, and Victoria (Map: Texas, D 5). About 20 miles from its mouth it divides into two branches, the south branch uniting with San Antonio River, and both emptying into San Antonio Bay, 140 miles southwest of Galveston. The length of the Guadalupe is about 250 miles, and steamers can ascend it to Victoria.

GUADELOUPE, ga̤'de-lo͞op', *Fr. pron.* gwȧ'-dlo͞op'. A French West Indian island colony situated between the British islands of Montserrat to the north and Dominica to the south (Map: West Indies, G 3). The colony consists of: Guadeloupe, 582.8 square miles, pop., 183,001 according to the census of 1911; Marie-Galante, 57.7 square miles, pop., 19,422; part of Saint-Martin, 20.4 square miles, pop., 4174; Saint-Barthélemy, 9.5 square miles, pop., 2545; La Désirade, 10.6 square miles, pop., 1579; Les Saintes, 5.5 square miles, pop., 1709; Petite-Terre, 1.3 square miles; total, 687.3 square miles, pop., 212,430. Guadeloupe Island is in reality two islands, Basse-Terre and Grande-Terre, separated by an arm of the sea (Rivière Salée) about 4 miles long and varying in width from 100 to 400 feet. Basse-Terre, called Guadeloupe proper, has an area of 364.2 square miles, with 83,386 inhabitants; Grande-Terre, 218.6 square miles, with 99,615 inhabitants. Basse-Terre and Grande-Terre differ radically: the former is volcanic and mountainous, intersected by many streams; the latter is calcareous (superimposed upon an igneous base) and low-lying, few elevations being over 100 feet, while the water supply consists almost wholly of ponds and cisterns. In Basse-Terre, in the northwest part, is Grosse-Montagne (2370 feet); near the middle of the west coast are Les Deux Mamelles (2536 and 2368 feet); farther south are Sans Toucher (4856 feet) and the semiactive volcano La Soufrière (4869 feet), the highest point in Guadeloupe. Near La Soufrière is L'Echelle (4484 feet). Basse-Terre is famous for its scenic beauty; Grande-Terre for its plantations, especially sugar. The climate of Guadeloupe is hot and moist and not unhealthful in the more elevated parts of the island. The islands are subject to cyclones. The mean annual temperature is 78°. Guadeloupe, like most of the West Indies, has a fertile soil and produces chiefly sugar, coffee, cacao, vanilla, rice, bananas, etc. Over 30 per cent of the total area is under cultivation, and of that nearly 50 per cent is under sugar. The sugar industry of the island, which had greatly declined with the abolition of slavery, has again revived as a result of the importation of coolies, and the annual output amounts at present to about 70,000 tons. Cotton, rubber, and tobacco are also cultivated to some extent. The forests of Guadeloupe, confined largely to Basse-Terre, are quite extensive, abounding in campeachy or logwood, but, being difficult of access, they are little exploited. The commerce of the colony, while showing marked fluctuations, appears about stationary when the average of one term of years is compared with another. In the general trade imports and exports in 1890 amounted to 23,249,000 and 21,370,000 francs respectively; in 1900, 20,283,000 and 14,813,000; 1910, 16,804,000 and 24,053,000; 1911, 19,383,000 and 20,245,000 (12,362,000 francs from France and 19,420,000 francs to France); 1912, 19,524,000 and 26,084,000 francs. The colony of Guadeloupe is administered by a governor, an executive council of six, and a legislative council of 30 members. It is represented in the French Parliament by a senator and two deputies. The colonial budget for 1911 balanced at 4,560,000 francs; a subvention from the French government of about 300,000 francs is required. The population of the colony increased from 190,273 in 1906 to 212,430 in 1911; of the latter, 3641 were born in France and 12,306 were foreigners (mostly East Indian coolies); the great mass of the population is mulatto and negro. There are about 13,000 pupils in the elementary schools, mostly public. The capital is Basse-Terre (q.v.), with 8134 inhabitants in 1911. The commune of Pointe-à-Pitre, in Grande-Terre, at the south entrance of the Rivière Salée, is the chief commercial town and has a fine harbor; pop., 22,664.

Guadeloupe was discovered by Columbus on Sunday, Nov. 3, 1493, and settled by the French in 1635. During the latter half of the seventeenth century the colonists resisted several attacks by the British, who finally captured the island in 1759 and retained it until 1763. The island was again captured by the British in 1794 and 1810. In 1813 it was transferred to Sweden and in 1816 was formally restored to France. Slavery was abolished in 1848. Consult: *Annuaire de la Guadeloupe et dépendances* (Basse-Terre); Boumais, *Guadeloupe physique, politique, économique, avec une notice historique* (Paris, 1881); Stoddard, *Cruising among the Caribbees* (London, 1896); Ballet, *La Guadeloupe* (Basse-Terre, 1890–96); Guesde, *La Guadeloupe et dépendances* (Paris, 1900); André Blancan, *La crise de la Guadeloupe* (ib., 1904); Hermann Koerfer, *Der Guadeloupe-archipel und seiner wirtschaftliche Bedeutung* (Bonn, 1910). See Désirade; Marie Galante; Saint Martin.

GUADET, gwȧ′dȧ′, Marguerite Elie (1758–94). A French orator and statesman, born at Saint-Emilion. Already known as a lawyer, he was elected in 1791 to the Legislative Assembly and became one of the leaders of the Girondists. He was a very strong advocate of the constitution of 1791, and was President of the Assembly when the famous 10th of August uprising occurred. Although anxious for every curtailment of the power of the King, he attacked his enemies, Marat and Robespierre, quite as violently when reëlected to the Convention in 1792. The proceedings he demanded against Marat ended in the latter's acquittal, and Guadet took refuge in Saint-Emilion with his family, where he was discovered and shortly afterward guillotined at Bordeaux. Consult J. Guadet, *Les Girondins* (Paris, 1889).

GUADIANA, gwä′dē-ä′nȧ (Lat. *Anas*). One of the longest, but at the same time the narrowest and poorest in volume, of the five great Spanish rivers (Map: Portugal, B 3). The little river which has commonly been regarded as its head stream, and which bears the name of Guadiana Alto, rises on the west boundary of the Province of Albacete, about 8 miles northwest of the town of Alcarez. From its source it flows northwest for about 30 miles, after which it disappears among swamps, and, according to latest investigations, finds its way by a subterranean passage to the Záncara, a river which rises in the Province of Cuenca, and which should be considered the head stream of the Guadiana. A short distance from the Záncara are situated a number of lakes, called Los Ojos (eyes) de la Guadiana, which were formerly believed to indicate the subterranean course of the Guadiana. The Guadiana pursues a westward course through La Mancha and the Province of Estremadura, until, passing the town of Badajoz, it bends southward and flows in that direction through Portuguese territory, partly forming the boundary between Spain and Portugal, until by many channels it enters the Atlantic below the town of Ayamonte. It is about 520 miles in length, but is navigable for only 40 miles; it is, moreover, extremely difficult to enter from the sea, on account of the rapid changes which take place in the channels and bars of its delta. Its chief affluents are the Giguela on the right and the Jabalón and Ardilla on the left.

GUADIX, gwȧ-dēh′. A city of Spain, situated in the Province of Granada. It is situated on the river Guadix, about 35 miles east-northeast of the city of Granada (Map: Spain, D 4). Said to have been the first bishop's see in Spain, it contains the ruins of a Moorish castle and a cathedral. It has brandy distilleries and manufactures building materials, pottery, hemp goods, and hats; it carries on an extensive trade in cotton, flax, and corn. In the neighborhood are iron and copper mines and the popular mineral springs of Graena. Pop., 1900, 12,616; 1910, 13,820.

GUADUAS, gwȧ-do͞o′ȧs. A city in the Department of Cundinamarca, Colombia, situated in the fertile valley on the road between Bogotá and Honda, at 3100 feet above sea level. The town lies in a district producing coffee and sugar and abounding in asphalt deposits; its chief manufactures are leather and hats. Pop., 9000. It was founded by a monk, who built a convent there in 1614.

GUAGUA, gwä′gwȧ. A town of Luzon, Philippines, in the Province of Pampanga (Map: Luzon, D 7). It is situated on Pampanga Delta about 3 miles southwest of Bacolor, and has water connection with Manila. Pop., 1903, 11,028.

GUAGUANCHE, gwȧ-gwän′chȧ (Sp.-Amer., probably from the native name). A small barracuda (*Sphyræna guachancho*), occasionally taken in the southern United States.

GUAHIBAN, gwä-ē′ban. A tribe of western Venezuela and northeastern Colombia, South America. They occupy the territory between the Orinoco and the Meta. Consult Fernández and Barolomé, *Ensayo de gramática hispano-goahiva* (Bogotá, 1895), and B. Tavero-Acosta, *En el Sur* (Ciudad-Bolívar, 1907).

GUAHIBO. See Guahiban.

GUAIACOL, gwī′ȧ-kōl (from *guaiac*, from Sp. *guayaco*, *guayacan*, from the Haitian or South American name), or Methyl Pyrocatechin, $C_6H_4.OH.OCH_3$. A preparation obtained by distillation of beechwood creosote, of which it contains from 60 to 90 per cent. It is a colorless, oily liquid, soluble in 85 parts of water and much more freely in alcohol, ether, glycerin, and oils. Its taste and odor strongly resemble those of creosote, but it is less disagreeable. Of its compounds, guaiacol carbonate is best known. This is a tasteless, odorless, white powder, insoluble in water. Both guaiacol and its carbonate are employed as substitutes for creosote in the treatment of tuberculosis, being in many cases less irritating to the stomach. Guaiacol benzoate, a colorless, odorless powder, and guaiacol salicylate, a similar powder, have been used for the same purposes as the carbonate.

GUAIACUM, gwī′ȧ-kŭm (Neo-Lat., from Sp. *guayaco*, *guayacan*). A genus of trees of the family Zygophyllaceæ, natives of the tropical parts of America. The trees are remarkable for the hardness and heaviness of their wood, generally known as lignum vitæ, but also as guaiacum wood, and sometimes as brazilwood, as well as for their peculiar resinous product, guaiacum, often but incorrectly called gum guaiacum. The species to which the commercial lignum vitæ and guaiacum are commonly referred are *Guaiacum officinale* and *Guaiacum sanctum*, natives of the West India Islands and of some of the continental parts of America. *Guaiacum officinale* is a tree sometimes 60 feet high, with two or three pairs of ovate, obtuse, and perfectly smooth leaflets, pale-blue flowers, a furrowed bark, and generally a crooked stem and knotted branches. Some species have been grown as ornamentals in Florida and southern California. It seems probable that other species supply part of the guaiacum wood and resin of commerce. At present the supplies are obtained chiefly from Cuba, Jamaica, and San Domingo. The wood is exported in billets about 3 feet long and 1 foot in diameter, of a greenish-brown color. This is the color of the heartwood; the sapwood is pale yellow. Guaiacum wood sinks in water and is remarkable for the direction of its fibres, each layer of which crosses the preceding diagonally; annual rings are scarcely to be observed, and the pith is extremely small. It is much valued, chiefly by turners. Ship's blocks, rulers, pestles, and tenpin balls or bowls (q.v.) are among the articles most commonly made of it. When rubbed or heated, it emits a faint disagreeable aromatic smell; its taste is also pungent and aromatic. Shavings and raspings of the wood are bought by apothecaries for medicinal use. The bark is also used in medicine on the continent of Europe, but not in Great Britain or America. The virtues of both wood and bark depend chiefly on the resin which they contain, and which is itself used in powder, pill, and tincture. It has stimulant, diaphoretic, and alterative properties, and has been employed with advantage in chronic rheumatism, skin diseases, and catarrh. It has also been highly praised as a preventive of gout. The resin sometimes flows spontaneously from the stem of the guaiacum tree; it is sometimes obtained artificially. It is of a greenish-brown color and has a brilliant resinous fracture. It has scarcely any taste, but leaves a burning sensation in the mouth. One of its most striking characteristics is that it is colored blue by its oxidizing agents and is used as a test for such substances. It contains guaiacic acid, which closely resembles benzoic acid and yields on distillation certain definite compounds known as guaiacin, pyroguaiacin, and guaiacol.

GUAICURUAN, gwɨ-kōō′rōō-än′. A distinct stock of South American Indians living in the Gran Chaco. There are about 20 tribes of them, all of the same warlike, roving, equestrian habit. The best known of the tribes are the Abipone (q.v.), Guaicuru, Mataguayo (q.v.), and Toba (q.v.). The Guaicuru originally lived farther south upon the Paraguay River. They have a system of hereditary castes, distinguished by different colors used in painting the body, the ruling family painting with black. The men go naked, but the women wear a short skirt. They place large wooden labrets in the lower lip. They tend immense herds of cattle and horses, but refuse to cultivate the ground. Consult: Brinton, *The Linguistic Cartography of the Chaco Region* (Philadelphia, 1898); Kersten in *Internationales Archiv für Ethnographie*, vol. xvii (Leipzig, 1904); Koch-Grünberg in *Globus*, vol. lxxxi (Brunswick, 1902); Schuller, *Sobre el origen de los Charruas* (Santiago, 1906).

GUAJACON, gwä′Hȧ-kōn′. The Cuban name for the various top minnows of the genus *Gambusia*, exceedingly abundant in Cuba. See Plate of Killifishes and Top Minnows.

GUAJÁN, gwȧ-Hän′. See Guam.

GUAL, gōō-äl′, Pedro (1784–1862). A South American patriot, born in Carácas, Venezuela, and educated at the university in that city. He took part in the revolution of 1810, was a member of the Legislature, and secretary to Miranda. After an exile of several years he returned, was made Governor of Cartagena, and then Ambassador to the United States. In 1816 he joined Bolívar's revolt and for some time acted as Minister of Finance and Foreign Affairs in the newly established government. For many years he lived in retirement, which was broken only by a mission to Europe for Ecuador in 1837, resulting in the final acknowledgment of that state's independence by Spain. In 1858, while living quietly at Carácas, he was chosen President of a provisional government, established in opposition to that of Monagas; and again entered actively into political affairs, serving as President of the Council of State under the government of Julian Castro. In 1859 he was elected Vice President of the Republic of Venezuela, and succeeded, in the following year, to the presidency, from which he was removed when General Páez assumed the dictatorship in 1861.

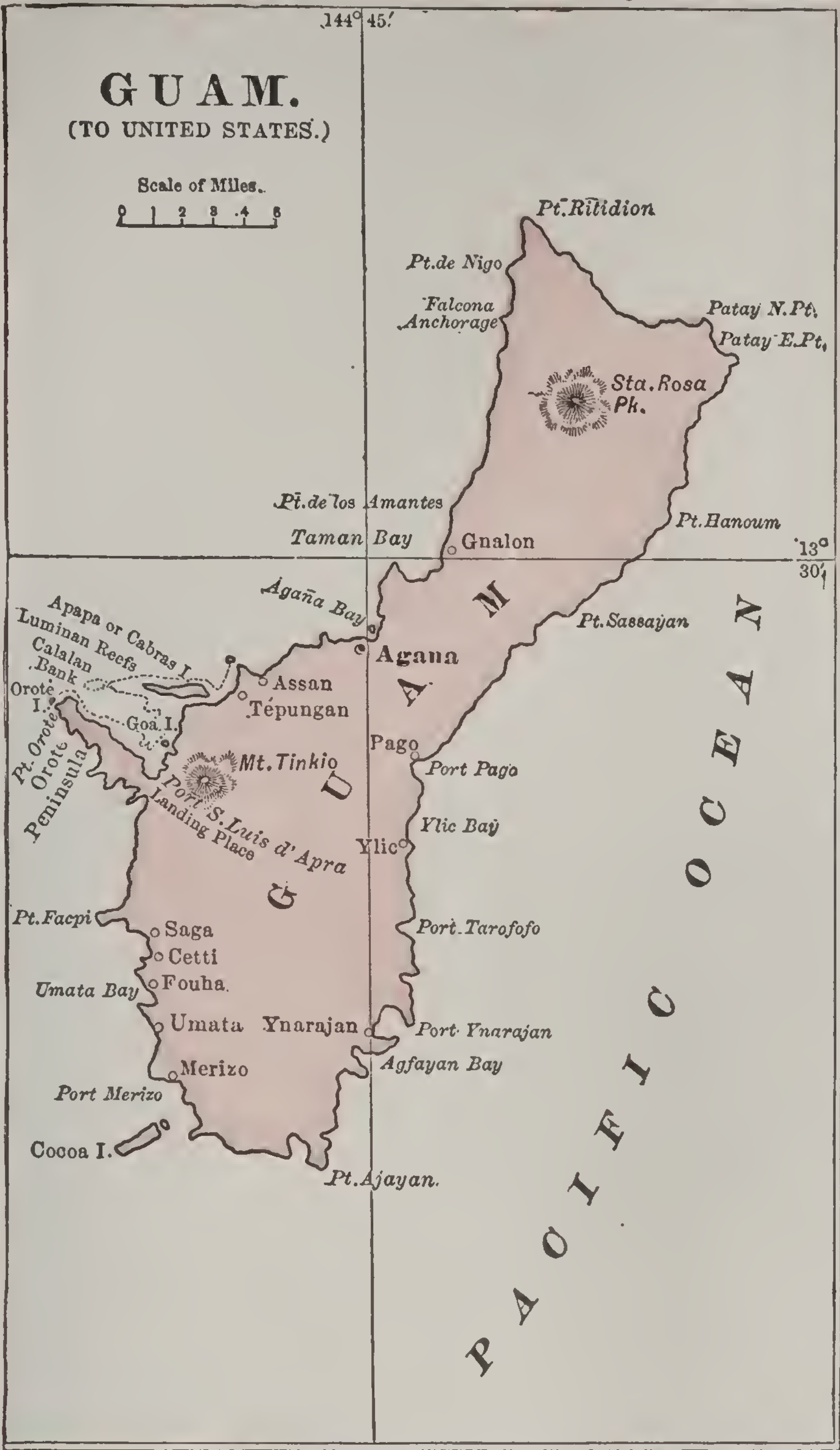
GUALBERT, gwȧl′bâr′, or **GALBERT**, John. See Vallombrosa, Congregation of.

GUALDO TADINO, gwäl′dȯ tȧ-dē′nȯ. An episcopal city in the Province of Perugia, Umbria, Italy, 22 miles north of Foligno. In the cathedral and in the city hall are paintings by Niccolò da Foligno. Near the city are the ruins of the ancient Taginæ, where Narses in 552 defeated and slew Totila, the Ostrogothic King. It produces pottery, silk, and oil, and has a good trade in oil, grain, and millstones. Pop. (commune), 1901, 10,055; 1911, 10,448.

GUALEGUAY, gwä′lȧ-gwī′. A city in the Province of Entre Ríos, Argentina, situated on a small tributary of the Paraná, 120 miles northwest of Buenos Aires. It has tanneries and flour mills and in its vicinity are situated extensive slaughterhouses. It has railway communication with the more important towns of the province, and through Puerto Ruiz, 7 miles below, it exports a considerable quantity of animal products. It contains a theatre, a library, and a branch of the National Bank. Pop., 1903, about 9000.

GUALEGUAYCHÚ, gwä′lȧ-gwɨ-chōō′. A city in the Province of Entre Ríos, Argentina, situated on the Gualeguaychú River, 12 miles from its junction with the Uruguay (Map: Argentina, H 4). The town has a library and a school, various milling establishments, important manufactures of beef extracts, and an active river trade. Pop., 1903, about 15,000.

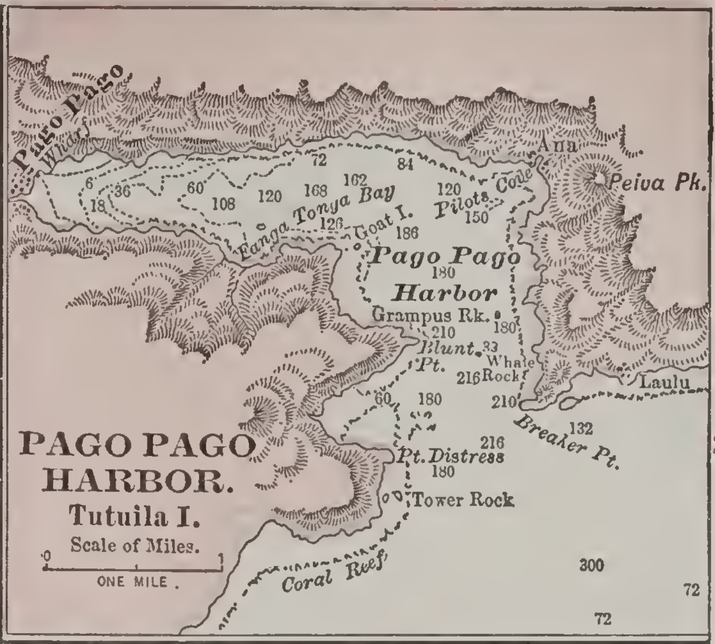
GUAM, gwäm, or **GUAJÁN**, gwȧ-Hän′. The largest, most populous, and most southerly in position of the Marianas, or Ladrone, Islands, a group which trends almost north and south along the one hundred and forty-fifth meridian east from Greenwich; and between the thirteenth and twentieth parallels of latitude, a distance of about 450 miles (Map: Asia, Q 7). The group forms a linear system of islands the south end of which has long been free from volcanic action. Such action appears more recent towards the north, active volcanoes being found on the extreme northern islands. Guam is 30 miles in extreme length and averages about 6 miles in width. It lies almost north and south, with the south half set slightly to the west of the northern. Its area is approximately 226 square miles. The geographical position of Fort Santa Cruz, in the Bay of San Luis de Apra, is long. 144° 15′ 33″ E., and lat. 13° 26′ 22″ N. The south-



GUAM.

(TO UNITED STATES.)

Scale of Miles.

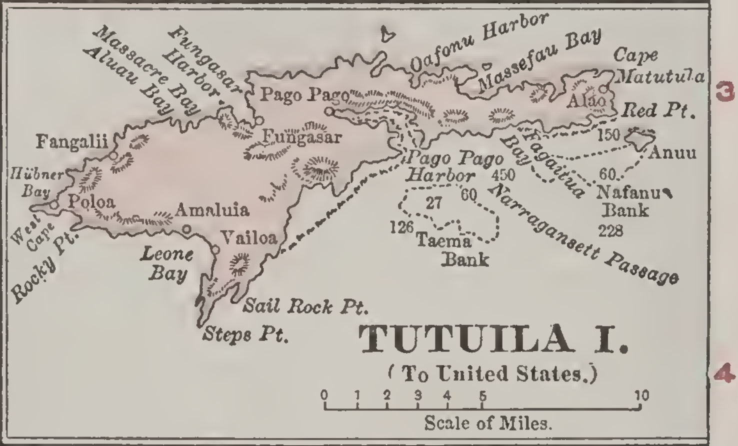


PAGO PAGO HARBOR.

Tutuila I.

Scale of Miles.

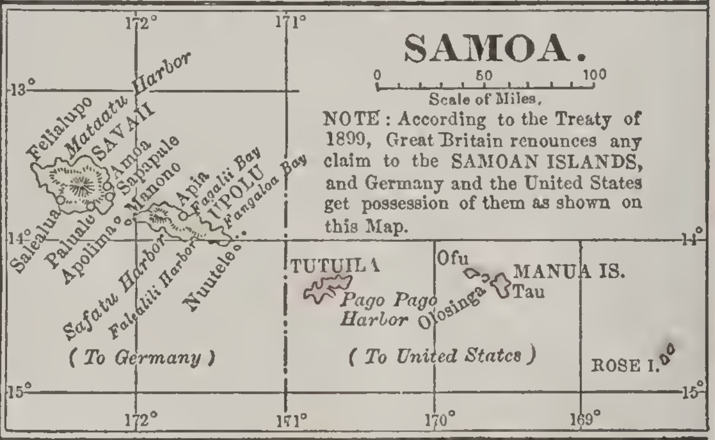
ONE MILE



TUTUILA I.

(To United States.)

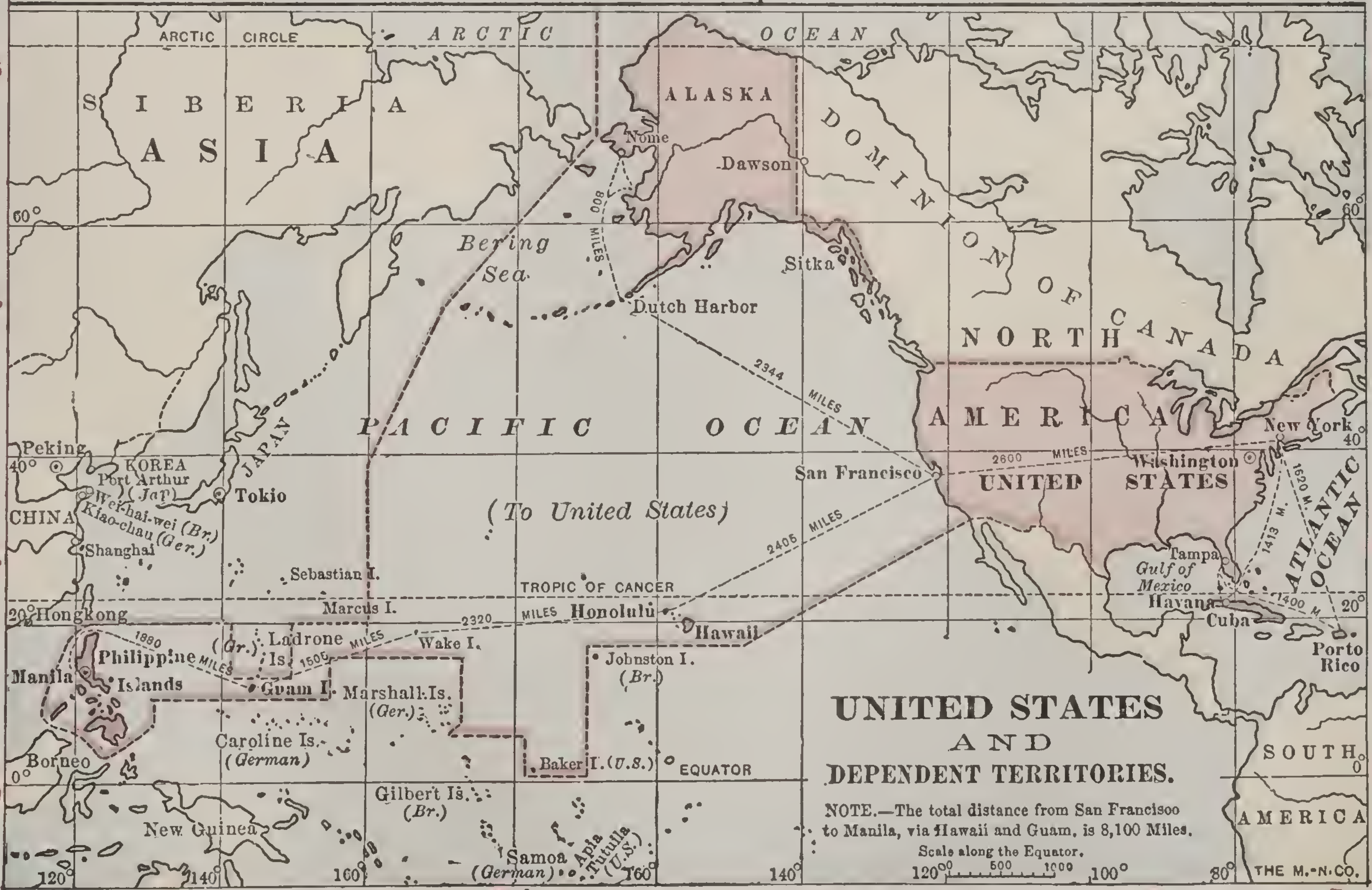
Scale of Miles.



SAMOA.

Scale of Miles.

NOTE: According to the Treaty of 1899, Great Britain renounces any claim to the SAMOAN ISLANDS, and Germany and the United States get possession of them as shown on this Map.



UNITED STATES AND DEPENDENT TERRITORIES.

NOTE.—The total distance from San Francisco to Manila, via Hawaii and Guam, is 8,100 Miles.

Scale along the Equator.

ern part of the island is high and mountainous. A chain or ridge of hills ranging in altitude from 700 to 1300 feet begins near the Bay of Pago and, crossing to the west coast near Agaña, follows the coast to the extreme southern part. The highest peak is Mount Jumullong Manggloc (1320 feet), just east of the town of Umatac. The topography of the northern half is entirely different, inasmuch as it is one large plateau, ranging in elevation from 200 to 500 feet, sloping generally from the interior to the sea, where it terminates in abrupt headlands and steep bluffs. This part is not watered by any perennial stream, and the only elevation of any prominence is Mount Santa Rosa (870 feet). The whole of the island is surrounded by a coral reef, with here and there a break permitting entrance to the harbors.

The climate of Guam is healthful and, on the whole, pleasant. The northeast trades prevail for six months of the year, during which there is little rain. From June to the middle of December the monsoon blows. Its warm winds strike the tops of the hills and cause precipitation, giving rise to the rainy season. The mean annual temperature is 81° F., and it is almost constant. Earthquakes are of common occurrence, but except for the severe shock of September, 1902, they have not been serious.

Copra is the most important product of Guam. Cacao of excellent quality has been raised and commands good prices in the Manila market. Coffee of good quality grows all over the island in groves of fair size. Sugar cane has been grown in Guam, but has never proved a success in manufacture on account of the shallowness of the soil. Three varieties of cotton grow uncultivated. The commonest is tree cotton, growing to a height of 60 or 70 feet. Produce which is raised for local markets comprises rice, corn, garden vegetables, mangoes, oranges, limes, papayas, tobacco, etc. Poultry raising is done on a small scale, but is difficult on account of rats and iguanas, which overrun the entire island.

The public lands of Guam are about 67,200 acres in extent, of which about 33,600 are leased and under more or less cultivation. It is mostly timberland and savannah, and a fair portion of it is fertile. The capital and most important city is Agaña (q.v.). Other towns on the island are Sumay, Agat, Merizo, and Inarajan. The original inhabitants were Chamorros, but long-continued wars in the seventeenth century nearly destroyed the male population, and it is probable that there are no people on the island to-day who are pure-blooded descendants of the Chamorros. They are intermixed with Tagalos and Malays. The men are of short stature, but well formed and strong.

Guam was discovered on March 6, 1521, by Fernando de Magallanes, then on his historic voyage around the world. It was not, however, until 1565 that anything like a formal occupation was attempted. In that year Miguel López de Legaspi, with three ships, took possession in the name of the crown of Spain. Missionaries came in 1668, and in the following year a church, called the Dulce Nombre de María, was erected in Agaña. Guam remained in the possession of Spain until June 21, 1898, when it was taken possession of in the name of the United States by the cruiser *Charleston.* Under American rule the administration is officially called the Naval Government of the Island of Guam, and the chief executive is an officer of the navy who holds the title of Governor by appointment of the President. The island is expected to become an important naval station for vessels sailing to and from the Philippines. The total imports for the fiscal year 1913 amounted to $160,249. Of these $75,165 was from the United States and most of the remainder from Japan. Exports amounted to $37,373, all of which was copra sent to Japan. The population on June 30, 1913, was 12,693, of whom 12,448 were natives. Consult: Griffis, *List of Books* [with references to periodicals] *on Samoa and Guam* (Washington, 1901); Wheeler, *Report on the Island of Guam* (ib., 1900); Forbes-Lindsay, *America's Insular Possessions* (2 vols., Philadelphia, 1906); *Guam* (ib., 1905); Cox and Dorn, *The Island of Guam* (Washington, 1911).

GUAN, gwän (South American name). A gallinaceous bird of Central and South America, often domesticated. It belongs to the same family (Cracidæ) as the curassow, the guans constituting the subfamily Penelopinæ. They have been separated into a number of genera, of which *Penelope* (16 species) and *Ortalis* (19 species) are the largest. All are rather large, varying from the body size of a grouse to that of a goose. Their plumage is mainly black, glossed with green, and varied with white and brown; nearly all have the throat bare, and many have pendent gular wattles. Their heads are often crested, and their tails are long and gracefully carried. They go about in large flocks, but separate into pairs during the breeding season and spend most of their time in the high forest trees, descending to the ground in search of fallen fruits, insects, and the like. Their nests are placed in trees, on bushes, or on the ground. Only one species ranges sufficiently far north to enter the United States. This is the Texan guan, or "chachalaca" (*Ortalis vetula macalli*), which is a dark, glossy, olivaceous-green bird nearly 2 feet long; but one-half of the length is due to the graduated tail of 12 feathers. It is noisy in the breeding season (April), the name "chachalaca" being imitative of its notes, which are as harsh and loud as those of a guinea fowl; and all the guans of a neighborhood join in a stentorian chorus at sunrise each morning. These birds may be easily tamed and to a certain extent are domesticated about the rural villages; but there seems little probability of their becoming a really widespread and useful fowl. See Plate of GROUSE, ETC.

GUANABACOA, gwä′nȧ-Bȧ-kō′ȧ. A town of Cuba, situated a few miles east of Havana (Map: Cuba, C 3). It is built chiefly on a range of hills and is surrounded by groves of trees, watered by numerous springs. It has a theatre, a lyceum, and a hospital. It was formerly an ancient Indian town, but the Indians were supplanted by Spaniards before the end of the sixteenth century. It received its town charter on Aug. 14, 1743. In 1762 it was sacked by the English. Pop., in 1907, 14,367.

GUANACO, gwȧ-nä′kȯ (Sp., from the South American name *huanaco, huanaca*). The larger of the two wild species of the camel family inhabiting South America, of which the llama and alpaca are domesticated varieties. This animal (*Lama,* or *Huanacus, guanaco*) has more the appearance of a hornless goat antelope than of a camel. Its back is flat and straight, its legs in fair proportion, its head small and neat, with long, pointed, expressive ears, and its tail reduced to a bushy stump. A full-grown male stands about 4 feet high at the shoulder and is covered with a thick coat of long, almost woolly hair, pale reddish in color, and longest and palest on the underparts. Domestication and artificial breeding with reference to the improvement of this coat have produced the alpaca (q.v.).

The guanaco is distributed throughout South America wherever a temperate climate exists. It inhabits the valleys of the Andes as far north as Bolivia and Ecuador, in company with the vicuñas (the other species of the genus, *Lama vicunia*), and there has habits very similar to its mountain-keeping relatives; but on the plains of Patagonia it ranges to the shores of the Atlantic and of Magellan's Strait and moves about in herds. The pairing season comes in August and September, and the young are born in May and June. They feed upon the pungent herbage of the Patagonian deserts as well as upon the bitter grasses of the pampas and furnish to the wandering natives their principal flesh food and the only skins useful for clothing or tent making, except those of the rheas. The Gauchos hunt them extensively also, and they form the principal prey of the puma, so that they take the place in South America of the antelopes of other plains regions. The guanaco also occurs on Tierra del Fuego and neighboring islands and swims readily from one to the other. Over a large part of its habitat none but salt water is to be had, and this it drinks readily. One very curious circumstance in its history is its habit of resorting to certain places in river valleys when it feels ill, so that nearly all which die a natural death seem to do so at these spots. This has been plausibly explained as due to the influence of an instinct inherited from the time when the country was much colder, and whenever storms or other distress afflicted the animals they were accustomed to seek a covert in the bushes which grew only alongside the sunken streams. Consult: Tschudi, *Reisen durch Sud-Amerika* (Leipzig, 1866–69); Darwin, *A Naturalist's Voyage* (London, 1860); Cunningham, *Natural History of the Straits of Magellan* (ib., 1871); Hudson, *The Naturalist in La Plata* (4th ed., ib., 1903); Spears, *Gold Diggings of Cape Horn* (New York, 1895). See Llama; Vicuña; Plate of Camels and Llamas.

GUANAHANI, gwȧ′nä-hä′nē̇. The name given by the natives to the island on which Columbus is supposed to have first landed, and which he called San Salvador. It is identified by some with Cat Island, one of the Bahamas, while others believe it to be the present Watling's Island, belonging to the same group. Consult Markham, *Life of Columbus* (London, 1892).

GUANAJAY, gwä′nȧ-ʜī′. The second town, in size, of the Province of Pinar del Río, Cuba (Map: Cuba, C 4). It is situated a short distance from the Puerto del Mariel, 20 miles west of Havana, and is the terminus of the Havana and Guanajay Railroad. It is surrounded by hills and is one of the best health resorts in the province. Pop., about 6400.

GUANAJUATO, gwä′nȧ-ʜwä′tō̇. An inland state of Mexico, bounded on the north by the State of San Luis Potosí, on the east by Querétaro, on the south by Michoacán, and on the west by Jalisco (Map: Mexico, H 7). Area, 11,376 square miles. The state lies entirely within the great central plateau of Mexico, Anahuac (q.v.), whose average elevation is 6000 feet above the sea. The surface is mountainous in the northern half, where it is traversed by the Sierra Gorda and Sierra de Guanajuato, while the southern half is more level. The chief rivers are the Lerma and its two tributaries, the Laja and the Turbio. There are a number of lakes in the southern part of the state, and mineral springs abound. The climate is semitropical in the plains and somewhat cold in the mountains. In the valleys and plains the chief industries are agriculture and stock raising, while in the mountainous regions mining ranks first. The chief agricultural products are corn, wheat, barley, tropical fruits, and red pepper. The mineral wealth of the state is very large, silver, gold, mercury, tin, lead, and copper being represented. The annual output of the mines is valued at about $14,000,000. Guanajuato has a large number of small cotton and woolen mills, flour mills, potteries, breweries, distilleries, etc. The state is traversed in several directions by the National Railways of Mexico. Guanajuato is one of the most densely populated states of the country; its population in 1910 was 1,081,651, or over 98 inhabitants per square mile. The capital is Guanajuato (q.v.). Consult Martin, *Mexico's Treasure House* (New York, 1906).

GUANAJUATO, or **SANTA FE DE GUANAJUATO,** sän′tȧ fā′ då gwä′nȧ-ʜwä′tō̇. The capital of the State of Guanajuato, Mexico, situated in the Cañada de Marfil, 6200 feet above sea level and 165 miles northwest of Mexico (Map: Mexico, H 7). Its streets are deep and tortuous, but the houses are well built, and its fine public buildings include the cathedral, the monasteries, the college, the gymnasium, the theatre, and the mint. The silver mines of the vicinity were the richest of all Mexico, but became unprofitable because of their great depth. New methods and use of electricity have revived the mining industry. It has woolen, cotton, and flour mills, and manufactures soap, chemicals, pottery and some silverware. It is a distributing centre for imported machinery and hardware. It has a fine system of water works. A United States consular agent resides here. Pop., 1910, 35,682. Guanajuato was founded in 1554, and under Spanish rule numbered over 100,000 inhabitants, receiving the title of city in 1741. It is one of the most historic spots in Mexico, having been originally distinguished by the heroic struggle of the natives of the region against Spanish conquest. In the war for independence the city was the scene of the first great battle at the storming of the Alhóndiga de Granaditas (q.v.) in 1810. It was repeatedly sacked during the long war.

GUANARE, gwȧ-nä′rå. Capital of the State of Zamora, Venezuela, situated near the river Guanarito (Map: Venezuela, D 2). It is a place of great importance in the cattle trade of the country. Its population is estimated at 11,000. Guanare was founded in 1593.

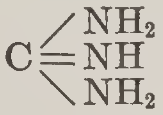
GUANCHOS, gwän′chō̇z (native *Guanchinet*, from *guan*, man + *Chinet*, Teneriffe). A Hamitic people, formerly numerous in the Canary Islands, associated with the ancient Canarii and Kamnurieh. Their subjugation by the Spaniards was completed about 1496, and they are now almost extinct. In craniological characters they approach the Cro-Magnon race of France, with subdolichocephalous skull, low forehead, and projecting jaws. Those who first described them say that they were a handsome people, tall, well built, athletic, and agile. Their complexion and hair were blond, but mixture with Arabs changed these characteristics in different islands. By their language and inscriptions they ally themselves with the Berbers of North Africa and the ancient Numidians. Consult Wallach, in *Journal of the Anthropological Institute,* vol. xviii (London, 1887–88).

GUANE, gwä′nȧ, or **GUANES,** gwä′nȧs. An inland town of Cuba, in the Province of Pinar del Río, and judicial seat of its district, about 20 miles southwest of Pinar del Río (Map: Cuba, A 4). It is the terminal of the Western Railway of Havana, and is a centre of tobacco production, cattle raising, and cedar lumbering. Pop., 1907, 1369.

GUANIDINE, gwä′nĭ-dĭn (from *guano*), CH_5N_3. An organic substance obtained in small quantities by the direct oxidation of proteids and readily converted into urea; it is therefore possibly one of the intermediate products of the gradual disintegration of proteids in the animal body. Guanidine is a crystalline solid substance soluble in water and alcohol; it acts as a powerful base, forming crystalline salts by combination with one molecule of acid. If boiled in aqueous solution in the presence of a little sulphuric acid or barium hydroxide, guanidine changes into urea and ammonia. If heated with concentrated acids or alkalies, it breaks up into ammonia and carbon dioxide. Just as the hydrochloride of urea changes on heating into biuret, so the hydrochloride of guanidine changes into biguanide, whose formula is

$$HN = C(NH_2)NH - C(NH_2)NH.$$

Guanidine itself is chemically an imino-urea, its constitution being represented by the following structural formula:



Guanidine

It may be prepared synthetically by the action of ammonium chloride on cyanamide in alcoholic solution. The best-known way of preparing guanidine, especially on a moderately large scale, consists in heating a mixture of ammonium sulphocyanate with charcoal and an oxide (like that of zinc) in a current of ammonia, the resulting product containing guanidine sulphocyanate:

$$\underset{\text{Ammonium sulphocyanate}}{2NH_4CNS} + \underset{\text{Zinc oxide}}{ZnO} = \underset{\text{Guanidine sulphocyanate}}{CH_5N_3.HCNS} + \underset{\text{Zinc sulphide}}{ZnS} + \underset{\text{Water}}{H_2O}.$$

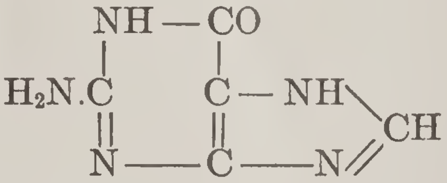
The most important derivatives of guanidine are kreatine and kreatinine (qq.v.), the former being methyl-guanidine-acetic acid, the latter an anhydride of kreatine. Guanidine is a strongly poisonous substance.

GUANINE, gwä′nĭn, $C_5H_5N_5O$. A yellowish-white amorphous substance, which derives its name from its being a constituent of guano. It also forms, however, the chief constituent of the excrement of spiders, has been found attached to the scales of fishes, and seems to occur normally in the mammalian liver and pancreas.

With regard to its occurrence in guano, as it has not been found in the recent excrement of sea birds, there is every reason to believe that it is formed by slow oxidation (from atmospheric action) of uric acid, much as uric acid can be made to yield urea and oxalic acid. In the pancreas and liver it probably represents one of those transitory stages of disintegrated nitrogenous tissues which are finally excreted by the kidneys in the more highly oxidized form of urea.

Guanine may be best prepared from Peruvian guano, which is for this purpose finely powdered and boiled with dilute sulphuric acid; on cooling and filtering, the solution is made alkaline with caustic soda and again filtered, whereupon the guanine contained in the solution may be precipitated with an ammoniacal solution of silver oxide. The guanine thus obtained being contaminated with considerable amounts of uric acid, it is washed with water, treated with dilute hydrochloric acid, and the resulting solution, after being filtered and decolorized with boneblack, is precipitated with ammonia; finally some urea in hot nitric acid is added, and guanine nitrate allowed to crystallize at ordinary temperatures; the crystals are dissolved in dilute sodium hydroxide, and then addition of ammonium chloride to the solution produces a precipitate of pure guanine.

Guanine is insoluble in water, ether, alcohol, and ammonia. By the action of oxidizing agents it is converted into guanidine (q.v.), parabanic acid, and carbon dioxide. The presence of guanine may be analytically detected with the aid of concentrated solutions of potassium chromate and potassium ferrocyanide, the former reagent producing an orange-colored, the latter a yellowish-brown, crystalline precipitate, in solutions of guanine. When treated with nitrous acid, guanine is transformed into xanthine. The chemical constitution of guanine has been determined by Emil Fischer, and at present guanine can be prepared synthetically by several different methods. The structural formula of guanine is as follows:



GUANO, gwä′nō (Sp. *guano, huano,* from Peruvian *huanu,* dung). A name applied to the excrementitious deposits of sea fowl, such as pelicans, cormorants, gannets, penguins, and petrels, which are found especially on certain coasts and islands where the climate is dry and the rainfall slight. The deposits sometimes contain, in addition to excrementitious matter, the remains of the birds themselves as well as of seals, walruses, and various other animals. Although the use of guano as a manure is comparatively recent, dating from about the middle of the nineteenth century, its value in agriculture was well known to the Peruvians long before they were visited by the Spaniards, probably as early as the twelfth century, and its collection and use were carefully regulated by the Incas. Alexander von Humboldt first brought specimens of guano to Europe in 1804 and had them analyzed. The most noted deposits of guano are those of the Chincha and other islands off the coast of Peru, but valuable beds have been discovered in many other parts of the world. The deposits, however, occur mainly within 10° to 20° north and south of the equator. The quality and value of the guano commercially depend almost wholly upon the amount of decomposition which it has undergone. The guano consists essentially of nitrogenous and phosphatic compounds, the former being chiefly ammonium salts and nitrates derived from the decomposition of the uric acid and urates which exist in the fresh excrements of the birds, as well as of undecomposed or partially decomposed uric acid and urates and other organic compounds. The ammoniacal salts and nitrates, and some of the phosphates, are soluble in water and are readily washed away by rain. In regions where very little rain falls the deposits of excreta suffer very little from leaching, and therefore retain nearly the whole of the nitrogenous and phosphatic compounds. On the other hand, guanos found in regions where rain falls freely lose a great part of their soluble constituents, but remain rich in the less soluble phosphates.

Aikman classes guanos as nitrogenous and phosphatic and gives the following data as to the composition of the deposits which were reported as still being worked in 1894:

COMPOSITION OF GUANOS

KIND OF GUANO	Nitrogen	Phosphoric acid
	Per cent	*Per cent*
NITROGENOUS GUANOS		
Saldanha Bay	9	9
Ichaboe	8	9
Pabellón de Pica	7	14
Punta de Lobos	4	15
Huanillos	6	13
PHOSPHATIC GUANOS		
Baker Island	....	39
Enderbury	....	37
Aves and Sidney Island	....	34
Malden Island	....	32
Browse Island	....	31
Huon Island	....	28

Until 1874 most of the so-called Peruvian guano was obtained from the Chincha Islands, situated about 12 miles off the coast of Peru, between lat. 13° and 14° S. Each of these islands is from 5 to 6 miles in circumference and is of granite, formerly covered with guano, in places to a height of nearly 200 feet, in successive horizontal strata, varying in thickness from 3 inches to 1 foot, and in color from a light to a dark brown. Sometimes, however, a vertical surface of upward of 100 feet of a perfectly uniform appearance was found.

Certain of the Peruvian guanos originally contained as high as 14 per cent of nitrogen, but the quality greatly deteriorated as the deposits became worked out. To make good this deficiency, it was at one time a common practice to "equalize" or "rectify" the guano by the addition of ammonium sulphate.

Guano was the first artificial fertilizer to be used in large quantities, and the remarkable benefits derived from its application led to a rapid extension of its employment and prepared the way for the general use of commercial manures and intensive culture. Guano is therefore of special importance historically, because of its influence on agricultural practice. As shown above, it is essentially a nitrogenous and phosphatic fertilizer, usually containing only a small percentage of potash. When used continuously, therefore, and not supplemented by potash fertilizers, there result an undue exhaustion of the soil as regards potash, and a consequent refusal of the soil to respond to further applications of the guano. This was, in fact, the experience of some of the earlier users of guano and unjustly brought the fertilizer into a certain measure of disrepute. The practice, formerly common, of applying salt with guano tended to hasten this exhaustion of potash in the soil.

The guano industry was at its height about the middle of the last century. Since then it has greatly declined in relative importance, due both to the exhaustion of deposits and to the utilization of cheaper sources of commercial fertilizers, such as the immense phosphate beds in different parts of the world, but especially in the United States, the nitrate deposits of Chile, and the potash deposits of Germany. Peru now scarcely furnishes enough guano for home consumption and has had to restrict exportation, resorting to the old Inca rule of a closed season for protection of the guano birds and rotation of digging, in order to conserve the supply.

The term "guano" is commonly applied to various other manures, such as fish guano and bat guano. The latter is the more or less altered accumulation of bat manure, found in certain caves where bats have been allowed to congregate undisturbed for many years. It sometimes contains as high as 9 per cent of nitrogen and 25 per cent of phosphoric acid, but is very variable in composition and is found in too limited quantities to be of much commercial importance. See MANURES and MANURING. Consult also Gardner, *Essay on the History, Character, and Value of Guano* (New York, 1844); Lee, *Treatise on the Relation of Peruvian Guano to American Agriculture* (in reports to United States House of Representatives, July, 1854); Nesbit, *On Agricultural Chemistry and the Nature and Properties of Peruvian Guano* (London, 1856); Aikman, *Manures and Manuring* (Edinburgh, 1894); Storer, *Agriculture* (New York, 1897); R. E. Coker, "Fisheries and Guano Industry of Peru," *United States Department of Commerce and Labor, Bureau of Fisheries, Bulletin 8*, part i (Washington, 1908).

GUANOALCA, gwä′nȯ-äl′kȧ (1530–91). An Araucanian cacique, born in the valley of Puren, Chile. Renowned for his victories over the Spaniards, he was elected commander in chief of the forces of the allied tribes in 1588 and was killed in the assault upon Marigueñu.

GUANO ISLANDS. A general term applied to the Chincha, Lobos, and minor groups of islands, off the coast of Peru, South America. They were so named from their large deposits of guano.

GUANTÁNAMO, gwän-tȧn′ȧ-mȯ (also called Santa Catalina del Saltadero, from the name of the mountains which surround it). An inland town in the Province of Santiago de Cuba, Cuba, situated about 10 miles north of the Bay of Guantánamo (Map: Cuba, K 6). It is connected by rail with Cainanera, its port. It exports coffee, sugar, and lumber. It was founded at the end of the eighteenth century, largely by families of French descent from Santo Domingo. Pop., 1907, 14,559. In 1903 the United States leased from the Cuban government the land on both sides of the entrance of Guantanamo Bay, about 20 miles from the town, for a naval and coaling station. Its position on the trade route from New York to Colon (about equidistant) and its proximity to routes from Europe to the entrance of the Panama Canal make it valuable as a naval base. It is the principal naval base of the United States in the West Indies, is well fortified, and its harbor can safely hold a large number of war vessels of all types.

GUAPORÉ, gwä′pȯ-rā′, or **ITENEZ**, ē̇-tā′nȧs. A river of South America, rising in Matto Grosso, Brazil, and flowing northwest between

Brazil and Bolivia, to its confluence with the Mamoré (q.v.), an affluent of the Madeira (Map: Brazil, E 6). Its entire length is about 950 miles, and it is navigable for light-draft vessels to the town of Matto Grosso, which is less than 100 miles from the source of the river.

GUAQUE, gwä′kȧ. A wild Carib tribe on the Caqueta River, on the border between Colombia and Ecuador. They are intelligent, and skillful in gathering wax and in other occupations. The couvade is in force among them. No woman must be seen by men during her monthly period, and at the birth of a child she must withdraw from the household for three months, during all which time her husband observes strict seclusion. See Couvade.

GUARÁ, gwȧ-rä′. A corrupt form of aguará (q.v.).

GUARANA, gwȧ-rä′nȧ (Brazilian name), or Brazilian Cocoa. A dried paste, made from the seeds of the *Paullinia sorbilis.* The dried seeds are reduced to powder, mixed with water to a stiff paste, and rolled into cylinders, which are then dried, forming a hard brownish mass. The substance has an astringent, bitterish, but not unpleasant taste, and is largely used as a stimulant by South American Indians. It is sometimes of the greatest service as a remedy for sick headache. The essential crystallizable principle of guarana is caffeine; of this, guarana usually contains between 4 and 5 per cent.

GUARANÍ, gwȧ′rȧ-nē′. One of the most important of all the groups of Indian tribes in America. The term has two meanings, applying (1) to the Guaraní proper (warriors), living between the Paraná River and the Atlantic, and (2) to the immense linguistic family called Tupí-Guaraní, spread formerly over Uruguay, Paraguay, and Brazil, with ramifications in Bolivia and Peru. Their numbers have been greatly exaggerated, running up into the millions. The population of Paraguay and Uruguay is largely Guaraní, or has the blood of that people in its veins. They are not tall (average height, 63½ inches). They are dolichocephalic and are also said to be light in color and to lack the coarse features of the average American tribes. The Guaraní were not, at the time of the discovery, altogether dependent upon hunting, but had developed peaceful arts and sedentary life. In one sense this made them an easy prey to both Spaniards and Portuguese, but it saved their lives and taught them new industries. The more vigorous, after enduring their oppressors for a century, moved up the branches of the Paraná into Bolivia, where they mingled with the Spaniards, learned their language, and developed a fine-looking breed. The Guaraní of Brazil, under the Portuguese government, were settled on reservations and have married with the whites, the mixed progeny being called Mamelucos. These are industrious and progressive in agriculture and arts. The manioc is their staple vegetable food, along with many wild roots and fruits. They hunt also a great variety of wild animals and catch fish. Poultry is reared, and besides dogs they have tamed parrots, swine, and ostriches. The villages are surrounded with a double line of palisades and consist of a number of large communal clan houses, in which each family has its fire; in many of these houses there are no partitions.

Some of the tribes wear skin or network cloaks, and others a waist garment of feathers like a Scottish kilt. Their weapons are the bow and arrow and clubs. The bow when straightened is also used as a lance. The tribes on the wide streams make dugout canoes 20 or 30 feet long, capable of carrying 30 persons. They have a simple upright loom and make netted hammocks. For bodily decoration they apply colored juice or clay, on which rude patterns are drawn; feathers of tropical birds are also used as ornaments. Drums, trumpets, and flageolets are their musical instruments.

The Tupí-Guaraní, scattered over the immense drainage area of the Río de la Plata and the southern affluents of the lower Amazon, had no political solidarity. They are most of them now either distinct tribes or groups, or settled down under different conditions with the white populations. Consult Martius, *Ethnographie und Sprachenkunde Amerikas* (Leipzig, 1867), and Brinton, *The American Race* (New York, 1891). See Tupí; Tupían Stock.

GUAR′ANTY, or **GUAR′ANTEE′** (OF., Fr. *garantie,* from *garantir,* to warrant, from *garant, guarant, warant,* warrant, from OHG. *giwerên,* Ger. *gewähren,* to grant). In its broadest sense, a contract by which one becomes legally liable for the debt, default, or miscarriage of another. In this sense it is used interchangeably with *suretyship* (q.v.). Frequently it bears a narrower signification, denoting a contract to pay money or do an act upon the failure of another to pay or to do. In the former case the principal debtor and the guarantor or surety are bound, ordinarily by a single contract, to the third person. In the latter case the guarantor's contract with the third person is separate and distinct from his principal's contract. A promissory note signed by A and B for A's debt is an example of a guaranty of the first class. A promissory note by A for his debt to which B adds a separate contract, by which he guarantees the payment of the note, illustrates the second class. There is some authority for the use of guaranty in a third and still narrower sense—as an undertaking, by the guarantor, to pay if the principal cannot; i.e., to pay only upon proof of the principal's insolvency. If the guarantor's agreement is made at the same time with that of the principal, the same consideration will answer for both; but a guaranty of an existing debt or liability requires a new and distinct consideration.

At common law, a guaranty was equally enforceable whether written or oral. By sec. 4, c. 3, 29 Car. II (see Frauds, Statute of), it is provided that the contract of guaranty must be in writing and signed by the party to be charged or by his authorized agent, if it is "a special promise to answer for the debt, default, or miscarriage of another person." Ordinarily a guaranty is such a promise, and thus within the statute; but it often happens that a transaction which partakes of the nature of a guaranty does not fall within the statute. The rules governing the construction of guaranties, the discharge of guarantors, and their rights against their principals will be considered under Suretyship. Consult: Brandt, *Suretyship and Guaranty* (3d ed., Chicago, 1905); De Colyar, *Law of Guarantees and of Principal and Surety* (3d ed., London, 1897); D. H. Pingrey, *Treatise on the Law of Suretyship and Guaranty* (2d ed., Albany, 1913); and the authorities referred to under Contract.

GUARAUNAN, gwä′rȧ-o͞o′nan. A tribe in

British Guiana, South America. Consult E. F. Im Thurn, *Among the Indians of Guiana* (London, 1883), and Tavera-Acosta, *En el Sur* (Ciudad-Bolívar, 1907).

GUARAUNO, gwȧ-rou′nō. A tribe of South American Indians, known to the English as Warraus, living in the delta of the Orinoco River, Venezuela. They are dark in color and well shaped in body. They are also industrious farmers and skillful laborers, building their houses upon piles to guard against the overflowing of the river. It is said, however, that they prefer the uplands, having been driven to the swamps by the inroads of the Caribs. They are estimated to be from 6000 to 15,000 in number and appear to constitute a distinct linguistic stock.

GUARD (OF., Fr. *garde*, from OF., Fr. *garder*, to guard, from OHG. *wartēn*, Ger. *warten*, AS. *weardian*, Eng. *ward;* connected ultimately with Gk. *ὁρᾶν*, *horan*, to look). Guards may be divided into four classes—exterior guards, interior guards, military police, and provost guards. Exterior guards are used only in time of war. They belong to the domain of tactics, and their purpose is to prevent surprise, to delay attack, and otherwise to provide for the security of the main body. On the march they take the form of advance guards, rear guards, and flank guards. At a halt they consist of outposts. Interior guards are used in camp or garrison to preserve order, protect property, and enforce public regulations. In time of war such sentinels of an interior guard as may be necessary are placed close in or about a camp, and normally there is an exterior guard farther on, consisting of outposts. In time of peace the interior guard is the only guard in a camp or garrison. *Military police* differ somewhat from either of these classes. They are used in time of war to guard prisoners, to arrest stragglers and deserters, and to maintain order and enforce police regulations in the rear of armies, along lines of communications, and in the vicinity of large camps. *Provost guards* are used in the absence of military police, generally in conjunction with the civil authorities at or near large posts or encampments, to preserve order among soldiers beyond the interior guard.

The various elements of an interior guard, classified according to their particular purposes and the manner in which they perform their duties, are as follows: (*a*) the main guard; (*b*) special guards—stable guards, park guards, prisoner guards, herd guards, train guards, boat guards, watchmen, etc. At every military post, and in every regiment or separate command in the field, an interior guard is detailed and duly mounted. It consists of such number of officers and enlisted men as the commanding officer may deem necessary and is commanded by the senior officer or noncommissioned officer therewith, under the supervision of the officer of the day or other officer detailed by the commanding officer. In order that guard duty may not be needlessly irksome and interfere with tactical instruction, the number of men detailed for guard is the smallest possible. In time of peace sentinels on fixed posts are replaced, as far as practicable, by watchmen. When more than one guard is required for a command, a field officer of the day is detailed, who receives his orders from the brigade or division commander as the latter may direct. The strength of guards and the number of consecutive days for which an organization furnishes the guard are so regulated as to insure privates of the main guard an interval of not less than five days between tours. The members of the main guards and stable and park guards are habitually relieved every 24 hours; sentinels are relieved every two hours.

The commanding officer exacts a faithful, vigilant, and correct performance of guard duty in all of its details, giving his orders to the officer of the day, who is responsible for the proper performance of duty by the guard with which he marches on and for the enforcement of all police regulations. The commander of the guard is responsible for the instruction and discipline of the guard, while the sergeant of the guard is the senior noncommissioned officer of the guard and, if no officer is present, performs the duties of the commander of the guard. The corporals of the guard post and relieve sentinels and instruct the privates in their orders and duties. Musicians of the guard sound the camp and garrison calls prescribed by the commanding officer.

Orderlies and color sentinels are privates of the guard selected for correct performance of duty, military bearing, neatness of person and clothing, smartness of arms and equipments. One orderly is detailed as orderly to the commanding officer. Color sentinels are placed on the color line, when established, to guard the colors and stacks of rifles. Privates of the guard are assigned to reliefs by the commander of the guard, and to posts, usually, by the corporal of their relief.

Orders for sentinels are of two classes, general orders and special orders. Guard orders apply to all sentinels, special orders to particular posts and duties. The members of a guard are given the countersign and parole. The countersign is a word given daily from the principal headquarters of a command to aid guards and sentinels in identifying persons who may be authorized to pass at night. The parole is a word used as a check on the countersign in order to obtain more accurate identification of persons. The countersign is usually the name of a battle; the parole, that of a general or other distinguished person. Watchmen are enlisted men detailed as watchmen or overseers over prisoners, and as such receive their orders and perform their duties as the commanding officer may direct. Compliments from a guard consists in the guard turning out and presenting arms. The guard takes charge of all prisoners in camp and garrison and has charge of the post flag, which is hoisted at the first note of reveille and lowered at the last note of retreat. The reveille and retreat gun is fixed by the members of the guard.

Guard mounting is formal or informal, as the commanding officer may direct. It will be held as prescribed in the drill regulations of the arm of the service to which the guard belongs; if none is prescribed, then as for infantry. In case the guard is composed wholly of mounted organizations, guard mounting may be held mounted. Formal guard mounting is ordinarily held only in posts or camps where a band is present. The purpose of guard mounting is to give an opportunity carefully to inspect the individual men, their arms and equipments, before assigning them to their posts and duties, and formally to relieve the old guard marching off. Consult *Manual of Guard Duty, United States Army* (Washington, 1914) and *Field Service Regulations, United States Army* (ib., 1914).

For detailed description of formal ceremony of guard mounting and inspection of guards, see the *Drill Regulations* of the different arms of the service. See Advance Guard; Rear Guard.

GUARD, National. The organized militia of the United States. The term is generally used to designate a body of citizens organized for home defense. In this sense used during the French Revolution, and later with respect to local forces in Italy and Spain. See Militia; National Guard.

GUARDAFUI, gwär′dȧ-fwē′, Cape (Lat. *Aromatum promontorium*). Next to Ras Hafun, the most eastern point of the African continent, situated in lat. 11° 50′ N. and long. 51° 16′ E. (Map: Africa, K 3). It forms the extremity of an immense promontory, the northern part of Italian Somaliland, stretching seaward in a northeast direction, and washed on the northwest by the Gulf of Aden and on the southeast by the Indian Ocean.

GUARD BOAT. A picket or patrol boat. Also a boat sent by the guard ship of a fleet or squadron to carry the orders, mail, etc., between the flagship (or ship of the senior officer) and the other vessels.

GUARD CELLS. See Stomata.

GUARD′FISH′. See Needlefish.

GUARDI, gwär′dė, Francesco (1712–93). One of the foremost Venetian landscape painters. He was born in Venice, was a pupil of Canaletto, and like him painted Venetian scenes. Their works are sometimes confused, but Guardi's paintings are less finished than those of his master; his whole style is sketchier, more sparkling, and more picturesque, though architecturally less exact. He introduced processions of figures in brilliant colors, and peopled his pictures with animated groups in gay costume, all treated with unfailing spirit, and with every advantage of beautiful and harmonious color. Of his numerous works Simonson, the chief modern authority on the subject, enumerates 282 examples, scattered throughout Europe and America. Of these 51 are in London—9 in the Wallace collection, 7 in the collection of J. P. Richter, and 3 in the National Gallery; 38 in Paris—9 in the Louvre and 22 in the collection of Baroness Leonino; 13 in Philadelphia, all in the J. P. Johnson collection; 10 in Vienna, mostly in the Academy; 8 in New York—5 in the Hearn collection and 2 in the Metropolitan Museum ("Santa Maria della Salute" and "The Rialto"); 7 in Venice; 6 in the Berlin Museum; and 3 in Boston. Consult Simonson, *Francesco Guardi* (London, 1907).

GUARDIA, gwär′dyȧ, Tomás (1832–82). A Central American politician, President of Costa Rica, born in Bagaces, Guanacaste. He adopted a military career, and participated in the defeat of the Walker filibustering expedition in 1855. He was made colonel, and was Governor of Alajuela from 1866 to 1869, when he led a revolt against Jiminez, which resulted in his overthrow in 1870 and the establishment of Carranza as provisional President and Guardia as commander in chief of the army. Six months afterward he succeeded Carranza as provisional President, and towards the end of the year was elected President. From that time until his death he was virtually dictator of Costa Rica, resigning and reassuming the presidency a number of times, and finally dying in office despite his waning popularity. The interior of the Republic was much improved under his iron-handed administration, although he saddled the country with an enormous debt by attempting to construct an interoceanic railway.

GUARDIAGRELE, gwär′dė-ȧ-grā′lȧ. A city in the Province of Chieti, Italy, 18 miles from the Adriatic and from Ortona, the nearest railway station. It markets grain, olives, and vegetables, and has numerous fairs. Four miles from the town is a mineral spring, rich in bicarbonate of iron and magnesia. Pop. (commune), 1901, 9493; 1911, 9971.

GUARDIAN, gär′dĭ-*a*n. One having lawful custody and control of the person or property, or both, of an individual who cannot take care of himself. In this sense the term includes guardians of lunatics, idiots, habitual drunkards, spendthrifts, etc., though such a guardian is usually in the United States styled a "committee." It also embraces a guardian or overseer of the poor and many other custodians. But in its more usual acceptation the word guardian is employed to denote one who has the custody and control of the person or property, or both, of an infant, i.e., of a person under 21 years of age, during the whole or some part of his minority. Such guardians exist either by virtue and operation of law or by special appointment by parents or courts.

I. In the first class are (1) guardians *by nature;* (2) guardians *for nurture;* (3) guardians *in socage;* and (4) guardians *by estoppel.* (1) A guardian by nature is, in England, one who has the care and charge of the person but not of the property of the heir apparent. The guardianship continues until the ward reaches the age of 21. (2) In English law also a guardian for nurture is one who has the management of the persons only of all the children other than the heir apparent, until they are 14 years of age. Both of these species of guardianship represent the natural right of parents to the custody and control of their children. They vest, therefore, in the father or, upon his death or disability, in the mother. In the case of illegitimate children the mother has the sole right of guardianship. In the United States, where all the children inherit equally, these two forms of guardianship are substantially the same, and are governed by the laws covering the relation of parent and child. (3) Guardianship in socage, now of rare occurrence, was the usual form of guardianship where lands held by socage tenure descended to an infant under the age of 14. It extended to the inherited estate as well as to the person of the ward and later to any other property, real or personal, that he might have. The person entitled to guardianship was the infant's next of kin who could not possibly inherit the property. It ceased when the ward reached the age of 14 if the infant elected to appoint another guardian. Otherwise it might continue. This form of guardianship is obsolete in most of the United States, and in those States where it is retained it is no longer necessary that the guardian shall be incapable of inheriting from the infant. (4) A person who officiously meddles with the property of an infant may be required by the court to account to the infant, the same as if he were in fact guardian. He is then said to be a guardian *by estoppel.* See Estoppel.

II. Guardians appointed by parents or courts are now the most common. They include: (1) testamentary guardians and (2) judicial guardians, and within the second class are embraced (*a*) guardians in Chancery, (*b*) guardians *ad litem*, and (*c*) guardians appointed by courts, by virtue of some statutory authority. (1) The English statute 12 Car. II, c. 24, first gave to a father power to appoint by will a guardian of his minor children, born or unborn, and vested in such testamentary guardian control of both the person and the estate of the ward until he became 21 years of age. That statute has been generally reënacted in the United States. Such a guardian is under the jurisdiction of the courts of equity, must account strictly for his acts, and is the recipient of a personal trust which cannot be delegated to another. (2) (*a*) The King of England early delegated his power, as *parens patriæ*, to appoint guardians for infants and other incompetent persons to the Court of Chancery, and that authority still exists in the Chancery Division. In the United States the same right is exercised by courts of equity, though frequently regulated and modified by statute. The guardianship lasts until the infant is 21 years old, but after he is 14 his wishes will be taken into consideration by the court in making the appointment. (*b*) It is also an inherent power of a court, before which an infant comes as a defendant in an action, to appoint a guardian *ad litem* or special guardian for that particular suit. The appointee is usually a relative or friend of the infant defendant. His authority is confined to the representation of his ward in the legal proceeding for which he is appointed. (*c*) It was only by force of statute that the English ecclesiastical courts acquired the power to appoint guardians for infants. And the same is true of probate and surrogate courts in America. That power is generally conferred on such courts in the United States, and in some States other designated courts are given the same authority, by special statutory enactment.

The authority of a guardian closely resembles that of a parent. He has in general the custody of the ward's person, the right to change his domicile, or bind him out as an apprentice, the direction of his education, secular and religious, and the power to deal generally with his personal property, and to sell and dispose of the same. But he cannot sell the real estate of the ward, though it is his duty to manage and lease it, and to receive the rents and profits for the ward's benefit.

The duties of a guardian are summarized in the statement that, since he is in effect a trustee, he must act exclusively in the ward's interest, and must take no profit to himself by virtue of his position. He must keep the property productive, and invest in such securities only as are directly authorized by law or by the court. He is not obliged to support the ward, except out of the ward's property. His acts are closely scrutinized by the courts and he may be required, from time to time, to give an account of his dealing with the ward's property. The ward has generally one year after becoming of age in which to call the guardian to account. The guardian's compensation is usually statutory and by way of commissions on the sums disbursed by him on his ward's account.

The guardianship of the person terminates when the ward marries, and the better authorities hold the same to be true as to the property. The court which appoints a guardian may remove him for good cause. Guardians not judicially appointed cannot be removed by a court in England, but in the United States such power is generally vested in the courts by statute. For the guardianship once vested in lords of lands held in chivalry or by knight's service under the feudal system, see TENURE; WARDSHIP. Consult Woerner, *The American Law of Guardianship* (Boston, 1897); H. S. Kelley, *Treatise on the Law Relating to Executors, Administrators, and Guardians* (4th ed., Kansas City, Mo., 1913). See also PARENT AND CHILD.

GUARDIAN, THE. 1. A play by Massinger, licensed 1633, produced at court with success, 1634, and published in 1655. 2. A comedy by Abraham Cowley hastily written on the occasion of Prince Charles's passage through Cambridge, where the poet was a fellow (1641), and printed in 1650. In 1658 it was revised under the title of *The Cutter of Coleman Street*, and published in 1663. 3. A periodical founded in 1713, in London, by Richard Steele. It was the successor of the *Spectator*, but was issued only from March to October. Of the 176 papers, 53 were written by Addison.

GUARDIAN ANGEL, THE. A novel by Oliver Wendell Holmes (1867).

GUARD SHIP. In a fleet or squadron, the duty ship of the day. She must provide a guard boat which makes the rounds of the fleet or squadron one or more times a day carrying mail, orders, etc., to and from the flagship. She must also furnish additional special boats for this sort of service if called upon. She must furnish the patrol boats, if such are necessary, and are not supplied by other vessels of the fleet. An officer from the guard ship boards all vessels entering port if so required by the senior officer present, and makes a report to him in regard to them. The guard ship, during the 24 hours of the duty, hoists the guard flag at the fore, and at night is distinguished by a red lantern carried at the truck.

GUARINI, gwȧ-rē′nē, GIAMBATTISTA (1538–1612). An Italian pastoral poet, born at Ferrara of a noble family long renowned in the world of letters, and especially made famous by Giambattista himself. He early showed literary ability and, gaining admission to court, was often intrusted by Alfonso II with important diplomatic missions, such as that to Warsaw to procure the Duke's election to the throne of Poland. But by nature haughty, restless, and ambitious, in 1588 he suddenly left Ferrara, thus arousing the anger of the Duke, who for some time made it impossible for him to obtain employment at any other court. Finally becoming reconciled in 1595, he returned to thank the Duke, and later passed to the courts of Florence and Urbino. His last public mission was one of congratulation from the people of Ferrara to Pope Paul V on the latter's election in 1605. His last years, though gladdened by his reputation as a poet, were filled with domestic misfortunes and family quarrels. He died in Venice.

Guarini wrote numerous love and encomiastic lyrics, a comedy, *L' idropica*, a *Trattato della politica libertà*, many letters, and critical works in defense of his literary principles, *Compendio della poesia tragicomica, Il segretario.* He principally owes his fame, however, to *Il pastor fido*, to which is invariably coupled the *Aminta* of Tasso, whom he there emulates. The two are certainly the finest pastoral poems in Italian literature, and while *Il pastor fido* is more perfect in construction and technical execution, and is unsurpassed in elegance of language and wealth of delicate images, easy-flowing phrases, and ingenious witticisms, the *Aminta* is the more truly poetic. For, as De Sanctis says, "Guarini lacks the inspiration, the melancholy, the fantastic concentration, the profound sentiment of Tasso. . . . He is always speaking of love, but does not feel it. Nor does he feel pastoral life, that inclination to solitude and idyllic peace. . . . He has imagination but not fancy, *esprit* but not sentiment, a musical ear but not the harmony which in the soul is felt." He is only a consummate artist. *Il pastor fido* (begun about 1580, presented to Charles Emmanuel I, Duke of Savoy, in 1585, published in 1590, and first played in Crema in 1596) was intended to be a tragi-comedy. As a matter of fact it is a tragedy only in so far as in accordance with Greek tragedy the action is governed by Fate, and is a comedy only in that, following Latin comedy, the play ends happily. Again like the *Aminta*, it is in reality a beautiful lyric poem, a courtier's conception of ideal life. Happiness, in contrast with the highly conventional and artificial life led especially at court, was then identified with simple rustic life in the midst of beautiful Nature with its simple pleasures and free expression of one's feelings. Naturalism was the philosophy then popular, and *Il pastor fido*, an apotheosis of pastoral life and of the golden age, represents the triumph of Nature over Destiny. Becoming immensely popular, and influencing, among others, Calderón and Shelley, *Il pastor fido* has gone through about 170 editions, of which many are in the various languages into which it was soon translated, French, German, English, Dutch, Spanish, and Greek. Consult: V. Rossi, *B. Guarini e Il pastor fido* (Turin, 1886); F. De Sanctis, *Storia della letteratura italiana*, vol. ii (Naples, 1903); A. Saviotti, *Guariniana, ecc.* (Pesaro, 1888); A. L. Stiefel, in *Litteraturblatt für germanische und romanische Philologie*, vol. xii (Leipzig, 1891); M. W. Shelley, *Lives of the Most Eminent Literary and Scientific Men of Italy*, vol. ii (London, 1835); W. Everett, *Italian Poets since Dante* (New York, 1904).

GUARINI, Guarino (1624–c.1683). An Italian monk, mathematician, and architect, born in Modena. He was appointed architect to the Duke of Savoy, Carlo Emanuele II, and designed many public and private structures in Turin. These include the palace of the Duke of Savoy; the church of San Lorenzo of the Theatins; the sanctuary of the Madonna della Consolata; the mortuary chapel of the house of Savoy in the church of San Giovanni; and the church of St. Philip Neri. He also designed the churches of Santa Maria d'Etting, Prague, and Santa Maria della Providenza, Lisbon. All these are in the fantastic style of Bernini, which Guarini carried to the extreme of the baroque. Among his writings are *Disegni d' architettura civile ed ecclesiastica* (1668) and *Leges temporum et planctarum* (1678). Consult: Cicognara, *Storia della scultura* (3 vols., Venice, 1813–18); Milizia, *Lives of the Celebrated Architects, Ancient and Modern*, trans. by Cresy (2 vols.. London, 1826); Quatremère de Quincy, *Histoire de la vie des plus célèbres architectes* (2 vols., Paris, 1830).

GUARINO (Lat. *Varinus*) **DA VERONA,** gwȧ-rē′nō̇ dȧ vā-rō′nȧ (1370–1460). A learned Italian of the Renaissance, especially influential in reviving the study of Greek. He studied under Chrysoloras at Constantinople, and, after his return to Italy, taught in many places, including Venice, Verona, Padua, Bologna, and Florence. At one period he was tutor to Prince Lionello of Ferrara, and acted as interpreter for the Council of Ferrara. He translated the first 10 books of Strabo and a portion of Plutarch; wrote a Greek as well as a Latin grammar, and commented on Aristotle, Cicero, Persius, Juvenal, and Martial. Consult: Rosmini, *Vita e disciplina di Guarino* (Brescia, 1805–06); Sabbadini, *Guarino Veronese e il suo epistolario* (Salerno, 1885); Sabbadini, *La scuola e gli studi di Guarino* (Catania, 1896); Woodward, *Vittorino da Feltre and other Humanist Educators* (Cambridge, 1897); Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

GUARNERI, gwär-nā′rē̇, or **GUARNE′RIUS.** A noted family of violin makers of Cremona, Italy. The head of the family, Andrea (c.1630–98), learned his art of Nicolò Amati, for whom he worked from 1650 to 1665.—Giuseppe (1666–c.1739), son and successor of Andrea, was as much an imitator of Stradivarius as was his father of Amati.—Another son, Pietro (1695–?), was also a violin maker, but a much inferior workman to his father and brother.—The most famous member of the family was Giuseppe Antonio (1687–c.1745), who was a nephew of Andrea and a pupil of the famous Stradivarius. The letters "I. H. S." were written on many of his labels, in consequence of which he was popularly known as Guarneri del Gesù. Many reasons have been given by historians for the variable character of his work; the violins of his later days being of very inferior workmanship, while those of his medium period are regarded by connoisseurs as equal to those of Stradivarius. See Violin. Consult Horace Petherick, *Joseph Guarnerius, his Work and his Master* (London, 1906).

GUARNERIUS. An Italian jurist of the eleventh century. See Irnerius.

GUASA, gwä′sȧ. One of the huge sea bass or groupers of the tropical Atlantic, especially *Promicrops guttatus*. (See Jewfish.) The word "guasa" or "guaza," often corrupted in Florida into "warsaw," is the Spanish name of a similar fish first known in the Mediterranean, where it is called "merou" by French fishermen; and both these names are given in the West Indies to various groupers (q.v.).

GUAST, Pierre du. See Monts, Sieur de.

GUASTALLA, gwȧ-stȧl′lȧ. An episcopal city in north Italy, in the Province of Reggio nell' Emilia, about 18 miles north of Reggio, on the right bank of the Po, in the marshy, fertile plain which is cut up by canals (Map: Italy, C 2). It markets rice, silk, cheese, and wine, and has ancient fortifications, a tenth-century cathedral, a Gymnasium, a school of music, a municipal theatre, a public library, and a bronze equestrian statue of Ferdinand I of Gonzaga (died 1559) by Leone Leoni. Guastalla was founded in the seventh century by the Lombards. Paschal II held a council here in 1106. The Duchy of Guastalla, of which this city was the capital, came into the possession of the Gonzaga family in 1539. After 1746 the territory was annexed by the Empress Maria Theresa; in 1748 it was handed over to the Duke of Parma. In 1796 it was captured by the French, and the next year became part of the Cisalpine Republic. In 1805 it was given to Napoleon's sister Pauline, and in 1814 assigned by the Congress of Vienna to Napoleon's wife, Marie Louise. Shortly after her death in 1847 it was annexed to Modena (q.v.). Pop. (commune), 1901, 11,091; 1911, 11,881.

GUASTAVINO, gwȧs′tȧ-vē′nō̇. A system of vault construction introduced about 1883 by an Italo-American, R. Guastavino. Guastavino vaults are built of any form of two or more layers of thin, hard-burned tiles, laid in strong cement, breaking joints in each course. The idea was derived from the Roman use of flat tiles for centrings and linings of vaults. Guastavino vaults are remarkably light and strong and exercise very little thrust.

GUATEMALA, gạ′te-mä′lȧ, *Sp. pron.* gwä′tȧ-mä′lȧ. The largest and most important of the five Central American republics, containing nearly one-half of their collective population and leading them in the extent of its domestic and foreign commerce. It has a frontage of 200 miles on the Pacific and of 70 miles on the Caribbean Sea (Gulf of Honduras). It extends from lat. 13° 54′ to 17° 48′ N., and is bounded on the northwest and north by Mexico, on the east by British Honduras and the Gulf of Honduras, on the southeast by Honduras and Salvador, and on the south by the Pacific Ocean (Map: Central America, B 3). Its area (estimated) is 48,300 square miles.

Topography. The Pacific coastal plain is somewhat broad in the west and quite narrow in the east near the coast of Salvador. At the foot of the mountains its slope is very noticeable, but nearing the sea it is almost level. It is also so low that in the rainy season lakes form which connect with the sea by channel, thus rendering their waters brackish (esteros). The Pacific ports, San José, Champerico, and Ocos, are merely open roadsteads. The Atlantic ports are Livingston and Puerto Barrios, the latter having a good natural harbor.

Three distinct topographic features mark the interior, crossing the country east and west. In the north is the broad, low, hilly plain of Petén, of tertiary and cretaceous formation, covered with forests and grasses, and still largely unexplored. In the centre the plain rises to a high plateau surmounted by the sedimentary ranges of the Sierra Madre system, which in their highest point attains an elevation of about 11,000 feet. The plateau is continued to the south, and is bordered along its south edge by the volcanic mountains which skirt the Pacific coastal plain and are roughly parallel with the Pacific shore line. This southern part of the plateau is covered deep with the débris of eruptive rocks and ash, forming plains of very rich and productive soil among the mountains. Accordingly, the most important agricultural districts are among the uplands of the south, and much nearer the Pacific than the Atlantic. Most of the volcanoes are extinct; but there have been recorded within the historic period severe eruptions of Tacaná, Cerroquemado, Fuego, and Pacaya. Other volcanic summits are Agua, Atitlán, Tajumulco (seemingly the loftiest elevation of the land), Acatenango, and Santa María. Earthquakes are very frequent in the neighborhood of the volcanic belt, and some of them have destroyed many towns. The effects of a very destructive earthquake on April 18, 1902, which resulted in the partial destruction of the important city Quezaltenango, were recorded by seismographs all over the world; and the volcanic eruptions from the Santa María group that followed in late October buried a large area of coffee lands under several feet of the same volcanic ash that has contributed to make this southern portion of Guatemala one of the large coffee producers.

The volcanic belt forms the water parting between the Atlantic and the Pacific river systems. On the Pacific side the rivers descend the steep slopes as torrents to the narrow coastal plain, and are unsuitable for navigation. The Atlantic rivers, on the other hand, have a long and gentle slope; but they are of little consequence as water highways, though the Motagua, the most southern and important of the Atlantic group, is navigable for 100 miles. Other streams are the Polochic and the Usumacinta (on the Mexican frontier). There are many lakes without visible outlet in the Cretaceous rocks of north Guatemala, the largest of which is Lake Petén, and among the eruptive rocks farther south are many beautiful mountain lakes. The largest lake of the Atlantic slope is Yzabal (the Golfo Dulce). It is shallow, considering its large area, but is navigated by steamers.

Climate, Flora, and Fauna. Lying wholly within the tropics, Guatemala would have a uniformly warm, moist climate if it were not for the great diversity of its surface in the central and southern parts. Here the differences in topography reach their maximum, with important effect upon climate, while the comparatively level areas of north Guatemala and the Pacific coastal plain have uniform tropical weather conditions. In the lower-lying hot lands (*tierra caliente*), up to 2000 feet above the sea, the mean temperature is from 77° F. to 82° F. The population here is very small. Fevers are prevalent, and most of the hot lands are unsuitable for settlement by the white races. These are the regions of cacao and banana culture, of the coco palm, and of rubber and mahogany forests. The healthful temperate regions (*tierra templada*), forming the central and southern plateaus and plains among the mountains, are from 2000 to 6000 feet above sea level. The zone between 2000 and 4000 feet, with a mean temperature of 68° F. to about 73° F., is the chief region of coffee culture. Less coffee is grown in the higher parts of the temperate lands, where the temperature has been known to fall to the freezing point. The cold lands (*tierra fria*), above 6000 feet, where the mean temperature is 50° F. to 63° F., are adapted to the cultivation of wheat, the potato, and apple; and in particularly favored spots, well exposed to the sun, even oranges and bananas, which, with sugar cane and cotton, are characteristic products of the lower altitudes, are successfully grown. Above 10,600 feet, among the highest mountains, where the mean annual temperature is under 50° F., there is no agriculture. Here are found alpine conifers, and there is more or less mountain grazing. The tops of the highest mountains are treeless and are sometimes covered with a little snow.

The Atlantic slope, swept to a considerable extent by east or northeast trade winds, has a larger rainfall than the Pacific slope, where the heaviest precipitation is on the southern slopes of the mountains. The driest regions are the plains among the mountains. These plains are partly screened by the elevations around them from rain coming from either ocean. Thus, the inland district of central Guatemala has only about 27 inches of rain in a year, which is sufficient for agriculture, while the city of

Guatemala, on the coast of the southern Cordillera, has 57 inches, and Tual, high on the Atlantic slope, 195 inches. The temperate lands, covering a large collective area in central Guatemala, are the great source of the country's agricultural wealth. Among the wild plants the bamboo grows in thickets on the low-lying Pacific seaboard, and the dense forests of the northern hot land are famous for their magnificent orchids. Animal life is more abundant in the moist than in the dry regions. A number of mammals, including the tapir and peccary, inhabit the forests. The alligator, and 30 species of fish previously unknown, were found in Lake Petén. Some of the most dangerous snakes find a home in the forest undergrowth. There are very many species of birds, the most notable of which is the quetzal, or long-tailed trogon, "with an emerald-green silky plumage, dashed with a golden lustre above, with a lovely purple hue below, and a tail 3 feet long." This bird has been chosen as the national emblem of the Republic. Horses, mules, cattle, sheep, swine, and goats are important factors in the industrial life of the drier and cooler agricultural districts.

Agriculture and Minerals. The principal industry is agriculture, for which the country is well adapted on account of its fertile and well-watered soil, as well as its favorable climate. Good lands may still be purchased for prices ranging from $18 up per acre, or leased on favorable terms. The total value of agricultural products in 1913 is given at $540,189,111 paper currency, as against $533,000,000 in 1912, and $186,000,000 in 1906. These sums represent the local value of coffee, sugar, cereals, vegetables, fruits, rubber, tobacco, wood, and cattle products. The most important product is coffee, Guatemala producing half the crop of Central America and being surpassed only by Brazil and the East Indies in the quantity harvested. Coffee is cultivated by German and United States planters on large plantations and is also grown on a smaller scale by a number of Guatemalans. The coffee exports in 1912 were 76,219,800 pounds, valued at $10,988,521 gold. In the lower regions where coffee is raised, the trees are shaded by the banana plant, which also yields good crops. Cane sugar yielded in 1913 about 79,705,000 pounds of sugar, distillers taking most of the crop. Tobacco, rubber, chicle, and beans are also important. The cultivation of cacao and vanilla, for which the country seems well suited, has fallen off; no exports were shown either in 1911 or 1912. The output of cereals, confined to narrow areas in the higher lands, is insufficient for the domestic demand. Cattle on the plateaus yield hides for export, and the cotton fields and high, dry sheep pastures provide fibres for the spinners and weavers who ply their trades in the homes. The mineral deposits have received little attention, although the mining code encourages the industry. They include gold, silver, salt, iron, lead, and coal, of which only placer gold is obtained, to some extent, in the valley of the Motagua River. In 1912 only 30,840 pounds of mineral products were exported, valued at $2737. The limited mining now being carried on is for the most part near the frontiers of Mexico, Honduras, and Salvador.

Manufactures and Commerce. The manufacturing industries are only slightly developed and are confined chiefly to the production of blankets, coarse cloth, straw hats, ponchos or cloaks, wooden and earthen wares, tobacco products, and leather goods. There is a large cotton mill at Cantel, established in 1885, with a capital of $600,000 gold. The transportation facilities are far from adequate. In many parts of the country there are merely paths on which trains of pack mules furnish the only means of transportation. The railway lines, all owned by American and German companies, have at present a total length of 502 miles. The Guatemala Central Railroad, connecting the capital, Guatemala, with the Pacific seaport of San José and with a branch line connecting Santa María with Patulul, is 141 miles long. The Northern, or Guatemala, Railroad, connecting the Atlantic port of Puerto Barrios and Guatemala City, and with the Quirigua branch, has a length of 220 miles. These two lines, as well as that of Ocos and the Occidental Railway, are managed by one company, the International Railways of Central America. The companies are assisted by annual subventions as well as by land grants. Puerto Barrios, the chief Atlantic seaport, is connected by steamers with New York and New Orleans. The Pacific ports have direct steam communication with San Francisco and Europe.

The chief article of export is coffee, which goes mainly to Germany, the United States (24 per cent of the total export in 1912), and Great Britain. Besides coffee, there are shipped hides and skins, bananas, rubber, sugar, and chicle. The imports consist chiefly of cotton goods supplied by Great Britain, the United States, Germany, and France; railway materials and telegraph and electrical supplies, chiefly from the United States; and building materials and iron manufactures, which are also supplied to a large extent by the United States. The value of the exports of Guatemala for 1912 amounted to $12,955,587 gold, as against $10,981,724 in 1911. The imports for 1912 amounted to $7,781,985 gold, as against $6,514,422 in 1911. The commerce with the United States, which was for a long time greatly handicapped by the lack of direct steamship lines between the Pacific ports of the two countries, increased with the establishment of a direct steamship line between San Francisco and Guatemala in 1900. The exports to the United States in 1912 were valued at $2,855,468 gold, about two-thirds being coffee. The United States sold to Guatemala in 1914 goods to the value of $3,601,813, of which flour and manufactures of cotton were the most important items.

Government and Finances. Guatemala has a democratic form of government and is governed under the constitution proclaimed in 1879. The executive power is vested in a President, who is elected directly for six years and is assisted by a cabinet of six ministers, and by a Council of State consisting of 13 members partly elected by the Assembly and partly appointed by the President. The legislative authority is vested in the National Assembly of 69 members, elected directly for a period of four years, at the rate of one deputy for every 20,000 inhabitants. For the administration of justice Guatemala has a Supreme Court, consisting of a Chief Justice and four associate justices, elected by the people; six courts of appeals, consisting each of a Chief Justice and two associate justices, all elected by the people;

and minor courts whose judges are appointed by the President at the recommendation of the Chief Justice of the Supreme Court. For governmental purposes the country is divided into 21 departments, which are subdivided into municipal districts. Each department is administered by an official called Jefe Político. He is appointed by the President. The municipal districts are administered by one or more alcaldes each, and by municipal councils, all elected by the people.

The regular army of Guatemala numbers about 7000 officers and men. The effective army is estimated at 56,900 men, and the reserve at 30,000. Availability for service is from 18 to 50 years of age. The metric system of weights and measures is in use.

Customs duties supply about three-fourths of the revenues, and about one-ninth to one-seventh of the governmental resources comes from internal taxes on spirits, tobacco, and other articles. The ordinary revenues increased from $9,139,872 paper currency in 1900 to $71,014,726 paper currency in 1912 (the paper dollar was worth only about 5.6 cents in 1912). In 1913 the revenues increased to $83,644,025 paper. The ordinary expenditures in 1900 amounted to $11,870,667 paper, and increased in 1912 to $76,682,917 paper. The interest on the public debt, schools, and the army consume about two-thirds of the government receipts. The total amount of the foreign debt (4 per cent interest), including arrears of interest, was $11,583,783 gold at the end of 1912; the internal currency debt amounted to $107,884,642 paper; and the total debt was about $17,577,000 gold. Most of the foreign debt is held in Great Britain and Germany. At present the payment of interest on the debt is about 17 years in arrears. This, however, is not likely to result in complete default, as the attitude of the later United States administrations has been, that the Monroe Doctrine should in no wise be interpreted to allow any country to escape its just obligations. Guatemala has six banks of issue, whose notes are legal tender even in case of debts contracted to be paid in silver. Guatemala is practically on a paper basis, gold and silver coins being little circulated. The value of the silver peso in United States currency fell from nearly $1 in 1874 to about 43.4 cents in 1913, while the paper peso is subject to fluctuations, and in 1913 was as low as 5.2 cents, and as 4.8 cents in the first quarter of 1914, in United States currency.

Population. The inhabitants numbered about 2,119,000 at the end of 1912. The density of population is greatest on the high, cool plateaus. About 65 per cent are Indians and negroes, and 35 per cent are Spanish Americans and mixed breeds, the last slightly exceeding the whites in number. The foreign population is only about 12,000, Guatemala being unable as yet, in spite of favorable legislation, to attract many immigrants. Nearly the entire population adheres to the Roman Catholic faith. There is no state religion. Perfect liberty of worship is granted. Education is free and nominally compulsory. In 1912, 59,631 children were enrolled in 1837 schools; in 1913 the number of pupils was 61,163. There were also numerous private primary and secondary schools, rural schools, 6 normal schools, a medical school, a law school, military school, and, in 1913, a college of agriculture was opened in Guatemala City. The educational system is the best in the Central American states.

History. Extensive ruins of cities, temples, and aqueducts found in all parts of Guatemala testify to the existence of a highly developed people before the advent of Europeans. The most careful study of these ancient remains, however, has as yet failed to reveal anything of the history of this prehistoric race, which was probably allied to, if not identical with, the Toltecs of Mexico. The country was conquered by the Spaniards, under Alvarado, between 1522 and 1524, and in no province of Spanish America were the natives so mercilessly oppressed as in Guatemala. Las Casas claimed that in the first 15 or 16 years of Spanish misrule between four and five millions of Indians perished. The province was governed as a captaincy general under the viceroyalty of New Spain down to the declaration of independence in 1821. In 1822 Guatemala was declared annexed to Iturbide's Mexican empire, a status which lasted for 15 months and was followed by the creation of the Confederation of Central America, consisting of the five states of Guatemala, Honduras, Nicaragua, Salvador, and Costa Rica, which adopted a federal constitution in 1825. Before the final dissolution of the confederation, in 1839, the State of Guatemala became independent (1833), adopting a liberal constitution, and then plunged into a condition of chronic warfare with its neighbors. Under the firm guidance of Rafael Carrera the country successfully withstood an attempt made by General Morazán in 1842 to establish an autocratic government in Central America. In 1850 the republics of Honduras, Salvador, and Nicaragua endeavored to force Guatemala into a new confederation, but were decisively defeated at Arada. Since that time there has been an ever-present tendency to resolve the office of president into that of dictator, from the attempt of Carrera, who was made President for life in 1854 and maintained himself in office until his death in 1865, to José María Regna Barrios, who installed himself as dictator in 1897 and was assassinated in the following year. Nor has Guatemala been able to resist the temptation of effecting by force of arms a new union of the Central American states, and in 1885 Rufino Barrios, who had come into power in 1873, fell in battle against the republics of Nicaragua, Costa Rica, and Salvador, which had formed an alliance for the preservation of their independent existence. The movement towards federation by peaceful means, instituted in 1895, came to naught after two years of negotiations. In 1898 Manuel Estrada Cabrera was elected President. He did much to promote education, commerce, and improvement of means of transportation. Upon his reëlection in 1905 he was accused of trying to become dictator and of ruthlessly oppressing his opponents. A revolt, organized in 1906 by General Barillas aided by some San Francisean adventurers, involved all Central America in war. Presidents Roosevelt and Díaz intervened and arranged an armistice, known as the Marblehead Pact (July 19, 1906), later incorporated into a treaty, which provided for improvements of commerce and navigation of the area involved in the war. In 1907 Guatemala joined in the Central American Peace Conference at Washington, which provided for a Central American Court of Justice. Estrada Cabrera was chosen President for a third term in 1910. In 1913

Great Britain demanded a settlement of claims, sending a warship to Guatemala. The latter appealed to the United States, after which an adjustment of the debt was made. For national coat of arms, see Colored Plate in article HERALDRY.

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GUATEMALA, or **SANTIAGO DE GUATEMALA,** sän′tė-ä′gō dȧ gwä′tȧ-mä′lȧ. The capital of the Republic of Guatemala, situated 85 miles from the Pacific coast on a plateau 5000 feet above sea level. The city is regularly built, is well supplied with water by an aqueduct, and has electric lights, street cars, and all modern conveniences (Map: Central America, B 3). Its principal buildings are the cathedral, the episcopal residence, the government palace, and the university building, in which the law school and the national library are installed. The city has also schools of art, medicine, engineering, and agriculture, a conservatory of music, and several technical evening schools. The International Bureau for promoting industries, commerce, and agriculture of the Central American republics is located here. Guatemala is the commercial centre of the country. It manufactures cotton and woolen goods, earthenware, gold and silver articles, cigars, and leather, and is the seat of a United States consul. Pop., 1910, 90,000. Guatemala is the third capital of the country to bear that name. The first was founded in 1524 and was overwhelmed in 1556 by a volcanic eruption. It is now called Ciudad Vieja, or Almalonga. The second capital, now known as Guatemala la Antigua, lies 25 miles west of the present capital and was almost entirely destroyed by an earthquake in 1773, the date of the settlement of the present Guatemala.

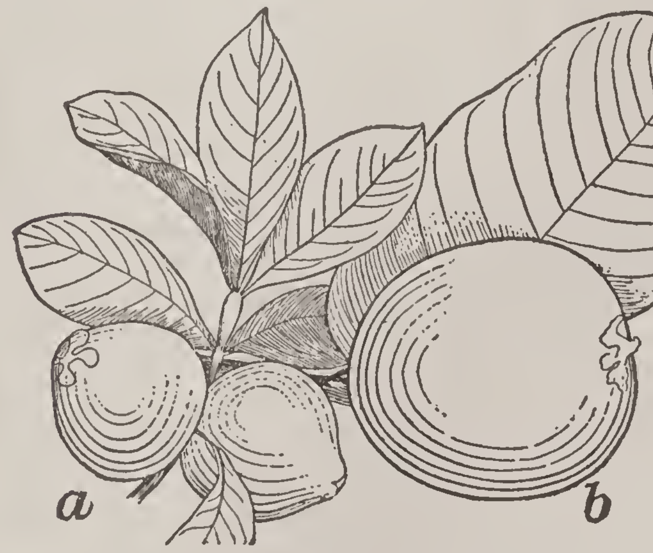
GUATEMOTZIN, gwä′tȧ-mō-tsēn′, **GUATEMOC,** or **CUAUHTEMOC** (1502–25). The last Aztec Emperor of Mexico. He was only 18 years old when he assumed charge of the operations against the invaders under Cortés, in November, 1520. He was a nephew of Motecuhzoma (Montezuma) and had been a leader of the party opposed to the latter's temporizing policy from the first arrival of the Spaniards. He organized the attack of the *Noche Triste* and after the return of Cortés, Guatemotzin, who had succeeded Cuitlahuatzin as Emperor, carried on the defense of the city of Mexico throughout the spring and summer of 1521. When further efforts became vain, he tried to escape from Mexico with his remaining followers, but was captured. Cortés at first treated him with much respect, but, failing to secure from him any information regarding hidden stores of gold, which probably existed only in the minds of the Spaniards, put him to the torture of a slow fire. When Cortés started on his difficult march across Honduras, he took the most important of his native prisoners with him as hostages for the good behavior of their people. During the journey Cortés was informed that the Mexicans were planning a rising against the white conquerors. A summary trial was forthwith arranged, and Guatemotzin, together with the other prisoners, who had been a serious hindrance during the march, was executed in February, 1525. Consult Díaz del Castillo, *True History of the Conquest of New Spain,* edition of Hakluyt Society (London, 1910–12), and Prescott, *Conquest of Mexico* (Philadelphia, 1863).

GUATIVERE, gwä′tė-vä′rȧ. The name in the Spanish West Indies of a genus (*Bodianus*) of small, brightly colored, much-spotted fishes, which abound in tropical seas and are good food. Two or three species occur along the Florida reefs, where they are called "negro fish" from their blackish-olive hue. See JACOB EVERTZEN.

GUATOAN, gwȧ-tō′*an*. A tribe in southwestern Brazil, South America. They inhabit the region about the confluence of the Paraguay and the São Lourenço. Consult: Max Schmidt in *Verhandlung der berliner Gesellschaft für Anthropologie* (Berlin, 1902); id., *Indianer-Studien in Zentralbrasilien* (ib., 1905); Chamberlain in *Science,* vol. xxxvii (Lancaster, Pa., 1913).

GUATUSO, gwȧ-t͞oo′sō. A wild tribe on the Río Frío, in the northern part of Costa Rica. They are a robust and athletic people, cultivating corn, bananas, and other crops, knitting hammocks and nets from agave fibre, but steadfastly rejecting the Spanish civilization, preferring to lead a free life. In consequence of the cruelties of the rubber gatherers they are rapidly dying out.

GUAVA, gwä′vȧ (Sp., Portug. *guayaba,* from Brazilian *guayaba, guaiva,* the native name). A shrub or small tree of the genus *Psidium,* native of the tropics of Asia and America, most common in the New World, and cultivated in suitable climates for its edible fruit. The lemon guava (*Psidium guajava*) is most commonly grown in Florida and the two Indies, attains a



GUAVA.

a, Psidium cattleyanum; b, Psidium guajava.

height of 20 feet, has numerous branches, obtuse, smooth leaves, 2 or 3 inches long, white fragrant flowers on solitary axillary stalks, and roundish or oblong smooth yellow fruit about the size of a hen's egg. The rind is thin and brittle; the pulp firm, flesh-colored, full of horny seeds, aromatic, sweet, and rather astringent. They, and the jelly made from them, are exported. The red guava, also referred to the same species, a plant common to both the Indies, bears a beautiful red fruit, with red flesh. Since it is acid and less agreeable than the lemon guava, it is less in cultivation. Besides these, the strawberry guava (*Psidium cattleyanum*) produces a small claret-colored fruit of excellent flavor and good preserving qualities.

GUAVIARE, gwä′vē-ä′rā. One of the largest tributaries of the Orinoco, rising in the Andes not far from Bogotá, Colombia, and flowing eastward (Map: Colombia, C 3). It forms the boundary in Colombia between the departments of Cundinamarca and Cauca. The region through which it flows is mostly level and very sparsely populated. Length, over 700 miles; navigable through the greater part. In the present undeveloped state of the country it is of little economic value.

GUAVINA, gwȧ-vē′nȧ (Sp.-Amer., probably from the native term). A name for sundry fishes of the goby family, common in the tropical rivers and useful as food.

GUAYAMA, gwȧ-yä′mȧ. A town of Porto Rico, in the Department of Guayama, situated at the southeast end of the island, about 4 miles inland (Map: Porto Rico, E 4). It has a good harbor and is surrounded by a sugar-growing region. Pop., 1899, 5334; 1910, 8321.

GUAYAQUIL, gwä′yȧ-kēl′, or Santiago de Guayaquil. A city, the chief seaport of Ecuador, situated on the west shore of the estuary of Guayas River, at the head of the Gulf of Guayaquil and connected by railroad (opened in 1908) with Quito (Map: Ecuador, A 4). The town lies in a low plain and is divided into two parts, the old and the new. In the old town the streets are crooked and ill-paved; in the new town they are well laid out, and lined by the residences of the richer class. The climate is unhealthful, and the water supply is bad—conditions which will be remedied when sanitary improvements, started in 1913, shall have been installed. The chief buildings and educational institutions are the cathedral, town hall, the college and technical school, and the hospitals. The town has a good harbor, protected by a breakwater, and the chief occupation is trade, both foreign and domestic. The city is the seat of the United States Consul General to Ecuador. Its chief exports are cacao, rubber, coffee, quinine, gold, silver, and hides. The town has a number of shipyards, ranking among the best on the Pacific coast of South America. Pop., about 80,000. Guayaquil was founded in 1535. Consult C. R. Enock, *Ecuador: Its Ancient and Modern History* (New York, 1914).

GUAYAQUIL, Gulf of. One of the largest inlets of the Pacific Ocean, on the west coast of South America, in the southwestern part of Ecuador (Map: Ecuador, A 4). It is over 100 miles wide at its mouth and narrows into an estuary of Guayas River, the entrance to the narrower part being divided by the island of Puná. Vessels drawing 22 feet can ascend to Guayaquil, while larger ones must anchor at Puná and transship their cargo.

GUAYAS, gwä′yȧs. A river of Ecuador, South America, rising in the west chain of the Andes, and flowing in a southwesterly direction into the Gulf of Guayaquil (Map: Ecuador, B 4). Its basin is estimated at 14,000 square miles. It is navigable for small steamers as far as Bodegas.

GUAYMAS, gwī′mȧs. A seaport of the State of Sonora, Mexico, situated on the Gulf of California (Map: Mexico, C 4). It has a good harbor, admitting large vessels, and is a leading Pacific port. It is an important trading centre, having railway and steamship connection with the United States. It exports gold, silver, pearls, and hides, and is the residence of a United States consular agent. Pop., 1900, 8648.

GUAYMI, gwī′mē. A tribe, probably of Chibchan stock, inhabiting the Veragua and Chiriquí districts of Colombia, extending across the Isthmus of Panama, from ocean to ocean.

GUAYRA, gwī′rȧ, La. See La Guayra.

GUAYULE, gwȧ-yōō′lȧ; *colloq.* or *dial. pron.* wȧ-yōō′lȧ, or **HUAYULE**, wȧ-yōō′lȧ (probably from the Spanish "hay" and Indian "hule," rubber). A name given a kind of rubber produced in Mexico. It is obtained from *Parthenium argentatum*, a spreading shrub of the family Compositæ. The plants grow 1 to 3 feet high, with spreading crown; the bark of the trunks and twigs is light gray; the leaves are lanceolate or spatulate and variously dentate; and the flowers are yellow, appearing in September or October. The plant occurs from western Texas and New Mexico through Mexico, but is commercially abundant only in parts of Chihuahua, Zacatecas, San Luis Potosí, eastern Durango, and southern Coahuila. The rubber is obtained from the dried plant by several patented processes, the bark yielding about three times as much as the wood, and the leafy shoots giving hardly any. The dried plant yields from 8 to 12 per cent rubber. Guayule rubber may be substituted for African rubber in many articles, and it is said to be well adapted to the manufacture of boots, shoes, etc. Attention was called to this plant as a valuable source of rubber by the exhibition from Durango at the Centennial Exposition at Philadelphia in 1876. Such a valuable source of crude rubber attracted attention, and this resulted in developing large business enterprises. At present extracting plants are established at several Mexican centres. The natural supply of guayule is limited, so that much investigation has been undertaken to grow the plant artificially. The problem was a difficult one, but seems to have been solved. From 1905 to 1909 over 40,000,000 pounds of crude rubber were shipped from Mexico, and since that time the amount has increased. For a complete account of the plant as a source of rubber, consult Lloyd, *Guayule, a Rubber Plant of the Chihuahuan Desert*, published by Carnegie Institution (Washington, 1911).

GUAZU, gwä′sōō. The word in the vernacular of eastern South America for any of several deer. Cf. Guemal.

GUBAT, gōō-bät′. A town of Luzon, Philippines, in the Province of Sorsogón. It is situated near the east coast, about 28 miles southeast of Albay. Pop., about 16,000.

GUBBIO, gōōb′bē-ō (Lat. *Iguvium*, mediæval *Eugubium*). An episcopal city in the Province of Perugia, Umbria, Italy, 70 miles east-southeast of Arezzo (Map: Italy, D 3). It is mediæval in appearance and is picturesquely situated on the southern slopes of the Apennines, 1735 feet above sea level. The most conspicuous building is the Palazzo dei Consoli, a huge Gothic structure with pinnacles and tower, erected in the fourteenth century. In the twelfth-century cathedral are fine sculptures, Umbrian paintings, a finely carved throne, and a famous cope. The Residenza Municipale contains ancient and modern majolicas and the Eugubine tables that were discovered in 1444 near the ancient theatre. (See EUGUBINE TABLES.) Gubbio has a municipal theatre. It markets cattle, grain, wine, oil, linen, and lumber, spins silk, and manufactures majolica, for which it has been famous since Giorgio Andreoli discovered his carmine finish. An interesting procession is that of the Ceri, on May 15. Pop. (commune), 1901, 26,320; 1911, 27,397.

GUBEN, go͞o'ben. The capital of a circle in the Prussian Province of Brandenburg, situated at the confluence of the Lubis with the Neisse, 30 miles south-southeast of Frankfort-on-the-Oder (Map: Germany, F 3). Situated in a picturesque rolling country devoted to the culture of the vine, it has wine presses, lignite mines, and mineral springs, and manufactures hats, woolen goods, machinery, paper, cardboard, gold leaf, lumber, and spirits. Guben passed, with Lower Lusatia, from the possession of Saxony to that of Prussia in 1815. Pop., 1900, 33,122; 1910, 38,593.

GUBERNATIS, go͞o'bĕr-nä'tēs, ANGELO DE, COUNT (1840–1913). An eminent Italian man of letters, born at Turin. He studied at the University of Turin and in 1862 was sent by the government to Berlin to perfect himself in philology. In 1863 he was appointed professor of Sanskrit in the Istituto degli Studi Superiori at Florence. But, attracted by the Socialistic theories of Bakunin, he soon resigned, only to discard his views later, and, after some hesitation, to be reappointed in 1867. He was called to the University at Rome in 1891. De Gubernatis was active as a dramatist, lyric poet, journalist, critic, Orientalist, and mythologist. His early works were contributions to Sanskrit scholarship. The *Zoölogical Mythology*, published in London (1872), gave him a European reputation. Among his scientific and literary works may also be mentioned his dramas, such as the trilogy *Il re Nala* (1859), the *Don Rodrigo* (1861), the *Drammi indiani* (1872), the *Savitri* (1877); his works dealing with Oriental studies, such as the *Piccola enciclopedia indiana* (1867), the *Fonti vediche dell' epopea* (1868), the *Mitologia vedica* (1874), the *Manuale di storia della letteratura indiana* (1882); his investigations into mythology, such as the *Manuale di mitologia comparata* (1880); his important biographical compilations, the *Dizionario biografico degli scrittori contemporanei* (1879–80), and the continuations since 1888 (cf. the *Dictionnaire international des écrivains du jour*, 1888), the *Ricordi biografici* (1873), the *Dizionario degli artisti italiani viventi* (1889–92); and the great history of literature and anthology entitled *Storia universale della letteratura dai primi tempi e presso tutti i popoli civili fino ai nostri giorni, con florilegi da ogni letteratura* (1882–85). He founded and carried on many periodicals and reviews; e.g., *La letteratura civile* (1859); *Italia letteraria* (1862); *La civiltà italiana* (1865); *Rivista orientale* (1867–68); *Rivista europea* (1869–76); *Bollettino italiano degli studi orientali* (1876 et seq.); *Revue internationale* (1883–87). A contributor to many reviews, he also directed the *Giornale della società asiatica italiana* after 1887.

GUDDEN, go͞od'den, BERNHARD VON (1824–86). A German physician, born at Cleves, and educated at Bonn, Berlin, and Halle. He specialized in the care of the insane, became assistant physician at the asylums in Siegburg and Illenau, then director of an establishment near Würzburg, and in 1869 professor of psychiatry at Zurich. From this position he went in 1872 to a like chair at Munich, where he also had charge of the district insane asylum of Upper Bavaria. Ennobled in 1875, he became physician to Prince Otho of Bavaria and had charge of the mad King Louis II, with whom he died in the attempt to keep the King from suicide by drowning in the Starnbergersee. His works include: *Beiträge zur Lehre von der Scabies* (2d ed., 1863); *Experimentaluntersuchungen über Schädelwachstum* (1874); and the posthumous papers collected by Grashey (1889). With Westphal he edited *Archiv für Psychiatrie und Nervenkrankheiten* (1868 et seq.).

GUDE, go͞o'de, HANS (1825–1903). A Norwegian landscape painter. He was born at Christiania and studied at the Düsseldorf Academy, especially with Schirmer and Achenbach. In 1854 he was appointed a professor at Düsseldorf, in 1864 at Karlsruhe, and in 1889 at Berlin. His subjects are taken from the scenery of his native land, and he excels especially in coast scenes with highly individual light effects. His pictures are good in composition, detailed in drawing, and not deficient in color, but, by reason of their rather bald realism and lack of emotional qualities, they are often tedious. He is best represented in the Museum of Christiania by seven landscapes and nine water colors; in Stockholm by three marines and one landscape; at Berlin by two good examples; also at Copenhagen, Helsingfors, Breslau, Hamburg, Leipzig, and in other German museums. Consult his biography by Dietrichson (Christiania, 1899).

GUDEHUS, go͞o'de-ho͞os', HEINRICH (1845–). A celebrated German tenor, born at Celle, near Hanover. He began life as a schoolmaster and organist. While he was studying singing with Madame Schnorr von Carolsfeld (q.v.), she recognized his talent and brought him to the notice of Von Hülsen, who at once engaged him for the Berlin Opera. After a successful début in 1871 he withdrew for further study with Luise Ress, and reappeared in 1875. From 1880 to 1890 he was a member of the Dresden Opera. During the season of 1890–91 he sang the principal Wagnerian rôles at the Metropolitan Opera House in New York. Wagner selected him to create the title rôle in *Parsifal* in 1882, after which time he was prominently identified with Bayreuth. He retired from the stage in 1900.

GUDEMAN, go͞o'de-mȧn, ALFRED (1862–). An American classical scholar, born at Atlanta, Ga. He graduated from Columbia University in 1883, and later studied at Berlin. He held appointments at Johns Hopkins (1890–93), Pennsylvania (1893–1902), and Cornell (1902–04). In 1904 he removed to Munich, Germany, to take an active part in the preparation of the great *Thesaurus Linguæ Latinæ.* (See DICTIONARY, *History.*) He contributed many articles to learned periodicals in America and in Europe, and to Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft.* His most important work is a very elaborate edition of the *Dialogus* of Tacitus (1894; a less elaborate edition followed in 1898). He edited also Tacitus' *Agricola* (1899; published, in revised editions, in German, 1902 and 1914), Tacitus' *Germania* (1900), and Sallust's *Catilina* (1903). He compiled also a *History of Classical Philology* (3d ed., 1902), published later, in revised and enlarged form, as *Grundriss der Geschichte der Klassischen Philologie* (1907 and 1909). In 1910 he published *Imagines Philologorum*, 160 portraits of classical scholars from the Renaissance to the present time.

GUDGEON, gŭj′on (Fr. *goujon*, It. *gobione*, from Lat. *gobio*, from Gk. *κωβιός*, *kōbios*, gudgeon). A fish (*Gobio fluviatilis*) of the carp family, Cyprinidæ, resembling the chub. It is very common in the streams of Europe, particularly such as have gravelly bottoms and occasional pools and rapids. It is about 8 inches long, has large scales, a barbule at the angle of the mouth, and a forked tail. The upper parts are brown spotted with black, and white below. The gudgeons swim in shoals, feed on worms, mollusks, and other small animals, are ready biters, and are easily caught. Many are taken with the casting net in shallow water and kept alive in the markets until sold. They are excellent food. There are other species in Europe. Nearly related species occur in America, but they are not known by this name.

GUDIN, gụ′dăɴ′, Théodore (1802–80). A French landscape and marine painter. He was born in Paris and studied for some time under Girodet-Trioson. Under Louis Philippe and Napoleon III he was marine painter to the court. In 1838 he was commissioned by the government to paint a cycle of pictures glorifying the French navy, 90 in all, of which 63 are in the Gallery of Versailles. His first works were at first good in color and spirited in execution, but he afterward lapsed into inferior work. His chief paintings are the "Burning of the *Kent* in the Bay of Biscay" and the "Hurricane of Wind in the Roadstead of Algiers, Jan. 7, 1831," both in the Louvre. Gudin was Commander of the Legion of Honor and received many foreign decorations.

GUDRUN, gōō-drōōn′. The chief of the Low German epic sagas, taking the place of the Nibelungen saga in High German. The legend is preserved only in a High German poem by an unknown Austrian author. There is but one manuscript copy, of the early sixteenth century, now in Vienna. It tells how King Hagen of Ireland had a daughter, Hilde, whose suitors he was wont to kill. Undiscouraged, King Hetel of Denmark sends a secret embassy, who persuade the willing maid to flee with them to him over sea. Hetel meets the bride on the shore, but the father is in hot pursuit. There is a fight on the beach. Hetel saves Hagen's life, and there is a happy reconciliation. This is the prelude. Hilde has a daughter, Gudrun. She, too, loves a foreign prince, Herwig of Seeland; but while her father is away "fighting the Moors," a rival, Hartmut of Normandy, carries her away. As before, the father pursues on his return and with him Herwig. There is another fine battle scene. Hetel is killed, and Hartmut carries away Gudrun for 14 years' hard captivity, soothed by Hartmut's sister, Ortrun, and terminated by a rescue through her lover and her brother Ortwin, all ending as before in a reconciliation. We have a higher stage of moral evolution, a more Christian standard than in the *Nibelungenlied*, and so, naturally, in the course of the epic there is a more thoughtful insight into the complex aspects of human nature. There is also a more delicate humor, though not the effeminate sentimentality of some other epics in this cycle. The time of the Gudrun saga is evidently that of the Danish raids on the English and Irish coasts, although its present form dates from the beginning of the thirteenth century. The subject is as old as the stories of Europa and Helen, but it was essentially a story of the seaside. Hence, though it was the more artistic, it appealed less to popular taste, and was not, like the *Nibelungenlied*, subjected to popular revision and extension. It had its origin, like the other, in epic songs, but it had an original poet for its author, and shows a constructive development by a more or less conscious plan. Thus it stands between the true popular epic and the studied epic of the court. It has 32 cantos, and its form is the four-line stanza with end rhyme, the last half line having two extra beats, one more than the *Nibelungenlied.* This gives it an unpleasant dragging effect. The saga has been treated dramatically by Julius Grosse and in an opera by Klughardt and Niemann. The best modern edition of the *Gudrun* is by Martin (Halle, 1901). There are translations into modern German by Simrock (1843), Klee (1878), Weitbrecht (1884, a paraphrase), L. Freytag (1888), Lemmermayer (1890), and Legerlotz (1900). Consult: Wilmanns, *Die Entwickelung der Kudrundichtung* (Halle, 1873); Albert Fécamp, *Le poème de Gudrun, ses origines, sa formation et son histoire* (Paris, 1892); Siegmund Benedict, *Die Gudrunsage in der neueren deutschen Literatur* (Rostock, 1902); F. E. Sandbach, *The Nibelungenlied and Gudrun in England and America* (London, 1904).

GUEBERS, gē′bẽrz *or* gā′bẽrz. See Ghebers.

GUÉBRIANT, gȧ′brē̇′äɴ′, Jean Baptiste Budes, Count de (1602–43). A French marshal, born at Plessis-Budes, in Brittany. He fought first in Holland, then held a command in the French troops that formed a portion of the German army in the campaign in the Lower Palatinate, and conducted the passage of the Rhine (1639). After the death of Duke Bernhard of Saxe-Weimar, its leader (1639), the army fought under the French banners with Guébriant in command. He defeated the Imperial troops at Wolfenbüttel (1641), and at Kempen (1642), where he was made marshal. At the siege of Rottweil, in Swabia, he was mortally wounded and died in the surrendered city (1643).

GUEBWILLER, gȧb′vē̇′lâr′. A town in Upper Alsace, Germany. See Gebweiler.

GUELDER (gĕl′dẽr) **ROSE,** or Snowball (from *Gelderland*, *Gelderen*, a Dutch province where this rose was supposed to have originated). A cultivated variety of the high-bush cranberry (*Viburnum opulus;* see Viburnum), in which the flowers are all barren and instead of forming flat cymes, as in the wild plant, form much larger globose corymbs. When abounding in flowers, it is a very ornamental shrub and is therefore often planted.

GUELDERS. See Gelderland.

GÜELL Y RENTÉ, gōō-ål′ė rån-tā′, Juan (1815–75). A Cuban author, born and educated in Havana. When 20 years old, he went to Spain and enlisted in the army, where he served for a number of years. When he returned to Cuba, he was for several terms sent as a representative of the island in the Spanish Cortes. He published several volumes of poems, including *Hojas del alma* (1846); *Ultimos cantos* (1859); *Noches de estío* (1861).—His brother José (1818–84) was born in Havana and was sent to Barcelona to be educated. After several years spent in practicing law in Cuba, he returned to Spain in 1848 and married Doña Josefa Fernanda, the sister of the King consort, in spite of royal opposition. This resulted in his banishment, and for several years he lived in Paris, where he was active in the liberal and republican conspiracies in connection with Spain. He published: *Amarguras del corazón* (1843); *Lágrimas del corazón* (1846); *Leyendas americanas* (1856); also several novels in French, and an historical work, *Philippe II et Don Carlos devant l'histoire* (1878).

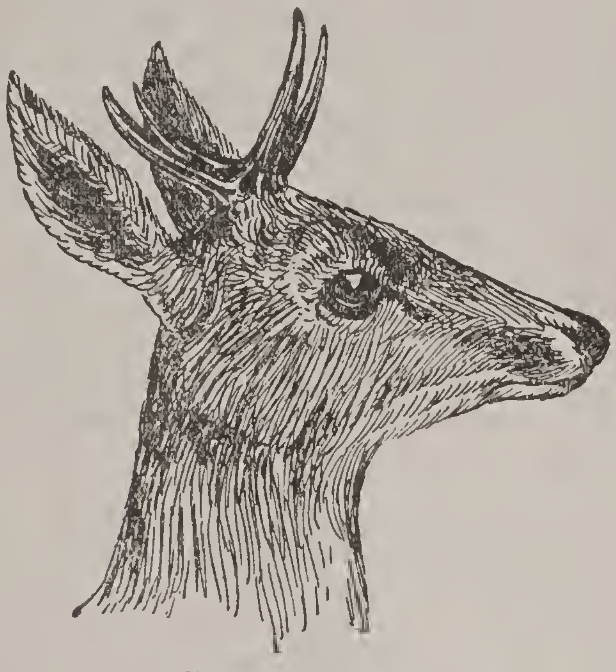
GUELPH, gwĕlf. The chief city and an inland port of entry of Wellington Co., Ontario, Canada, on the river Speed, 48 miles west by south of Toronto, and 28 miles northwest of Hamilton, on the Grand Trunk and the Canadian Pacific railways (Map: Ontario, D 6). It has fine public buildings and is the seat of the Ontario Agricultural College and Macdonald Institute of Domestic Science. The industrial establishments include manufactories of pianos, organs, sewing machines, carpets, clothing, steel and wire goods, woodenware, ironware, carriages, boots and shoes; also meat-packing plants, breweries, etc. The value of the products of manufactures in 1910 was $7,392,336, as compared with $3,689,183 in 1900, being an increase of 100.37 per cent. Guelph is an important centre for stock raising and has an annual winter fat-stock exhibition. The city owns its eight parks, its electric-light, water, and sewerage systems, street railway, and the Guelph Junction Railway (15 miles). Besides the water power supplied by the Speed River, which falls here 30 feet, electric power is supplied from Niagara Falls. A United States consul resides here. Guelph was founded by John Galt, the Scottish novelist (q.v.). Pop., 1901, 11,496; 1911, 15,175.

GUELPH FUND. The name given to the sum granted by the Prussian government, in 1867, to the deposed King of Hanover, George V, but withdrawn in 1868, on the latter's continued refusal to renounce his right to the throne. It amounted to about $12,000,000, and the income of it was kept by Prussia till 1879, when part of it was given to the widow and daughters of the King. The Duke of Cumberland, son of George V, acquired the entire income in 1892, on renouncing explicitly any intention of intriguing against Prussia. While Prussia administered the fund, the income was said to have been used in combating the Guelph intrigues; and the suspicion that Bismarck employed it for corrupt purposes, such as bribing the press, won for it the nickname of the "Reptile Fund."

GUELPHIC (gwĕl′fĭk) **ORDER.** An order of knighthood for Hanover, instituted by George IV, when Prince Regent, on Aug. 12, 1815. It became extinct in 1866. It was both a military and civil order, unlimited in membership, comprising five classes—Grand Cross, Commander of the first and of the second class, Knight, and simple member. The grandmastership was vested in the crown of Hanover. The badge of the order was an eight-pointed cross of gold, with lions between the arms and surmounted by a crown; in the centre was the white horse of Hanover surrounded by a blue circle, and the motto *Nec Aspera Terrent.*

GUELPHS, gwĕlfs, **AND GHIBELLINES,** gĭb′ė-lĭnz. The names of two great political parties, whose contentions and wars distracted northern and central Italy in the latter part of the Middle Ages. The designation "Guelph" (Ital. *Guelfo*, pl. *Guelfi*) is commonly supposed to be derived from Welf, the name of a princely family of Germany, which rose to great power in the twelfth century, when it was the rival of the house of Hohenstaufen, which occupied the Imperial throne. The most famous of the rulers of the house of Guelph was Henry the Lion, Duke of Saxony and Bavaria, who defied the power of the Emperor Frederick Barbarossa, and who was deprived of most of his possessions in 1180–81. The origin of the designation "Ghibelline" (It. *Ghibellino*) is altogether uncertain. A theory which has been widely accepted, but which rests on an insufficient basis, is that it became current as a modification of Waiblingen ("men of Waiblingen," one of the possessions of the Hohenstaufen in South Germany), the name, used as a battle cry, under which the followers of Conrad III (the first of the Hohenstaufen emperors) are said to have figured in the battle of Weinsberg, in which Welf VI, uncle of Henry the Lion, was defeated in 1140. About the beginning of the thirteenth century we find the names "Ghibellines" and "Guelphs" in use in Italy. The former may, in general, be described as the upholders of the Imperial authority in Italy (or, at the beginning, the supporters of the Hohenstaufen), the latter as the opponents of the Emperors. The opposition to Imperial authority in Italy arose from two distinct parties, which for the most part made common cause with each other—from the Church, which sought to assert its independence of the emperors, and from the principalities and city republics, which contended for their provincial or municipal rights and liberties. The Guelphs may therefore, in a measure, be said to have represented the National party. Florence, Bologna, and Milan took, as a general rule, the side of the Guelphs; while Pisa, Verona, and Arezzo were Ghibelline. Florence, especially, was the great stronghold of the Guelphs. The great Italian families in like manner took opposite sides, but the policy of each family frequently varied. As a rule, the nobles of the more northern districts of Italy inclined to the Ghibelline side, while those of the central districts were Guelphs. By degrees, however, and especially after the downfall of the preponderance of the German emperors in Italy, the contest ceased to be a strife of principles, and degenerated into a mere struggle of rival factions availing themselves of the prestige of ancient names and traditional or hereditary prejudices. In 1334 Benedict XII practically disallowed altogether the reality of the grounds of division between the parties, by proscribing, under pain of the censures of the Church, the further use of those once stirring names, which had long been the rallying words of a sanguinary warfare. After the fourteenth century we read little more of Guelphs or Ghibellines as actually existing parties, although the names were used in the sixteenth century for the partisans of Louis XII or of Maximilian. Consult: Browning, *Guelphs and Ghibellines* (London, 1893); Symonds, *Renaissance in Italy* (ib., 1904); E. Hutton, *Malatesta, Lord of Rimini* (New York, 1906); Villari, *Mediæval Italy* (London, 1910); Sedgwick, *Italy in the Thirteenth Century* (2 vols., Boston, 1912); also the general works on mediæval history referred to under ITALY and GERMANY. See FLORENCE; HOHENSTAUFEN; ITALY.

GUEMAL, gȧ-mäl′ (South American name). Either of two species of small deer confined to the Andes. They are distinguished from other deer (as the subgenus *Furcifer* or *Xenelaphus*) by their antlers, which have but a single forking, of which the front prong is the longer and projects straight forward, by the tusks in the upper jaws of both sexes, and also by the uniform coloration of the fawns. One species (*Mazama bisulca*, or *Cervus chilensis*) inhabits southern Chile, and the other (*Mazama*, or *Cervus, antisiensis*) the highlands of Peru. See PAMPAS DEER.



HEAD OF GUEMAL.

GÜÉMEZ DE HORCASITAS, gwā′mȧth dā ōr′kä-sē′tȧs, JUAN FRANCISCO, CONDE DE REVILLA GIGEDO (1682–1768). A Spanish soldier and provincial governor, born in Oviedo. Entering the army, he served with distinction in the siege of Gibraltar and in the conquest of Oran, rising to the rank of field marshal. In 1734 he was appointed captain general and Governor of Cuba, where he introduced many reforms in the government and was active in the defense of the colony against the attacks of the English. Appointed Viceroy of New Spain in 1746, he reformed the administration of the finances, fostered new settlements, fortified Vera Cruz and Acapulco, and drew up regulations for the militia of Cuba and Florida. He was superseded in 1755 and in the following year returned to Spain, where he was promoted to the rank of captain general of the army and was made president of the council of war. His "Memoria á su sucesor" is published in *Instrucciones que los Virreyes de Nueva España dejaron á sus sucesores* . . . (Mexico, 1867).

GÜÉMEZ PACHECO DE PADILLA HORCASITAS, gwā′mȧth pȧ-chā′kō dȧ pȧ-ᴅē′lyȧ ōr′kȧ-sē′tȧs, JUAN VICENTE, CONDE DE REVILLA GIGEDO (1740–99). A Spanish administrator, born at Havana, Cuba. He was captain of the Viceregal Guard in Mexico, under his father, and won military distinction as lieutenant colonel of the Spanish Guards at the siege of Gibraltar. In 1789 he was appointed Viceroy of New Spain, where he served till 1794. During his administration, which was one of the most beneficent in the history of Spanish rule in Mexico, he made many public improvements and did much in developing commerce and industries. Notwithstanding his able rule, he suffered a severe *residencia*. Afterward he was director general of the artillery of the Spanish army. Consult Revilla Gigedo, *Instrucción reservada que dió á su sucesor* (Mexico, 1831–32), and Bancroft, *History of Mexico* (San Francisco, 1883–88).

GUENDAR. See GONDAR.

GUENON, ge-nôɴ′ (Fr., ape, monkey). A term for a group of African monkeys, forming the large genus *Cercopithecus* and including the malbrouak, vervet, grivet, green, patas, mona, diana, and various other species, elsewhere mentioned. All are small, slender, arboreal in habit, gregarious, strikingly colored, and so hardy and docile in captivity that they furnish the most familiar forms to menageries. They are the servants of organ grinders, and pets all over the world. These are the monkeys best known by the ancients of Egypt, Greece, and Rome. Anatomically they more closely resemble the langurs than any other group.

GUÉRARD, gā′rȧr′, ADOLPHE (1841–). A French engineer. He was born in Vosges, at Raon-l'Etape, France, and was educated at the Ecole des Ponts et Chaussées. Entering the engineer department of the army, his first important maritime engineering was in connection with the canal connecting the mouth of the Rhone with the port of St. Louis. He was then in charge of extensive river and harbor improvements connected with the deltas of the Rhone, and installed the mechanical facilities which have made Marseilles one of the best-equipped ports in the world. In 1892 he was appointed the French representative of the International Commission to study the improvements of the sanitary conditions of Cairo. He became inspector general of the first class in the Corps of the Ponts et Chaussées; in 1899 took charge of the inspection of all the important French ports; and in 1895 was made a member of the International Consulting Commission of the Suez Canal Company. Upon the nomination of the French government, President Roosevelt appointed Guérard a member of the Consulting Board of Engineers of the Isthmian Canal Commission, which reported early in 1906.

GUERCINO, gwĕr-chē′nō (It., squint-eyed), a nickname of GIOVANNI FRANCESCO BARBIERI (1591–1666). A Bolognese painter of the Eclectic school. He was born at Cento, near Bologna, studied under local masters, and then at Bologna under the influence of Ludovico Carracci (q.v.). His earliest works show the influence of Caravaggio (q.v.), whose pictures he certainly saw, and are marked by strong contrasts of light and shade and by the naturalism of that master. In 1616 Guercino founded a popular school of painting at Cento; in 1619 and 1620 he visited Ferrara and Venice, and in 1621–23 he was at Rome. To this period belong the "Raising of St. Petronella," in the museum of the Capitol at Rome; his fresco of "Aurora," in the Villa Ludovisi, Rome; and his "St. William of Aquitaine Assuming the Monk's Garb," in the Gallery of Bologna. Upon the death of his patron, Gregory XV, in 1623, Guercino returned to Cento, where he made his home until 1642. In 1619 he painted the frescoes of the cupola of the cathedral of Piacenza with subjects representing prophets and angels, sibyls, and scenes from the New Testament.

Upon the death of Guido Reni (q.v.), in 1642, Guercino attempted to fill his place at Bologna. He imitated Guido's manner, but without success, losing his own strength and vigor. His house at Cento, with its fine paintings and fresco decorations, is still preserved.

Guercino left 250 large pictures, besides frescoes and smaller works, and a number of drawings. Among his chief paintings, besides those mentioned above, are: "St. Bruno and his Companions in the Desert," in the Gallery of Bologna, and the "Capture of St. Roch" (1618), a fresco in San Rocco, Bologna; "St. Peter Raising Tabitha," in the Pitti Palace, Florence; the "Death of Dido," in the Spada Palace, Rome; "Abraham Casting off Hagar," in the Brera, Milan; the "Prodigal Son," in the Museum of Turin—the last two belonging to his later period; "Cephalos and Procris," at Dresden; the "Ecstasy of St. Francis," in the Louvre; the "Assumption of the Virgin," at St. Petersburg. Consult: Calvi, *Notizie della vita di Barbiere* (Bologna, 1842); Malvasia, *Felsina pittrice* (ib., 1678); Dohme, *Kunst und Kunstler Italiens*, vol. iii (Leipzig, 1887); G. Cantalamessa, *Lo stile del Guercino* (Bologna, 1891).

GUEREBA, gȧ-rā′bȧ (South American name). The black howler monkey. See Howler.

GUEREZA, gė-rē′zȧ (African name). A strikingly adorned monkey (*Colobus guereza*, or *abyssinicus*) of eastern Central Africa, found in forests from southern Abyssinia to Mount Kilimanjaro and westward beyond Lake Albert Nyanza. The head, body, and limbs are covered with black hair of moderate length; but a line of long hair, which hangs below the flanks, rises on both sides of the back and forms a white mantle. The dark face is also surrounded by a white fringe, so that long whiskers lie flat on the cheeks. The long tail terminates in a white tuft. The local variety on Mount Kilimanjaro exhibits these features in their highest perfection, the tail being "feathered" throughout its whole length with hair described by Abbott as glistening like spun glass. This long black and white fur so closely harmonizes with the moss on the trees that the monkeys are unrecognizable at a very short distance. This species is nowhere very numerous, since it has been persistently sought by the natives for the sake of its skin, with which the Abyssinian soldiers adorned their shields, while the Masai warriors used the white mantle and tail as a part of their battle costume. No specimen has thus far been taken to Europe alive. The genus *Colobus* contains about 30 species. Consult books of exploration in East Africa, especially those of Thomson, Johnston, Abbott, and Gregory; also Elliot, *A Review of the Primates* (New York, 1913). See King Monkey, and Plate of Monkeys of the Old World.

GUERICKE, gā′rĭk-*e*, Otto von (1602–86). A celebrated German physicist, known chiefly by his discoveries regarding the nature and effects of air. He was born at Magdeburg and studied in Germany and Holland, subsequently traveling in England and France, and becoming later an engineer in the army of Gustavus Adolphus. In 1646 he was made Burgomaster of Magdeburg and became greatly interested in the philosophical discussions over the vacuum which were in progress. The experiments of Galileo and Pascal on the weight of air led Guericke to attempt the creation of a vacuum. His first experiment was made by filling a stout barrel with water and then pumping out the water, but it was found that no sooner was a vacuum produced in the barrel than the air forced its way through. He next took a globe of copper provided with a stopcock and having an opening at the bottom, into which a pump was fitted. To his astonishment he found that the pump extracted the air quite as well as the water, and when he opened the cock the air rushed in with a whistling noise. This, the first air pump, was invented about 1650. (See Air Pump.) Guericke's invention soon became famous, and in 1654 he was summoned to the presence of the Emperor Ferdinand III of Germany at Ratisbon, at which time he made the famous experiment commonly known as the "Magdeburg Hemispheres" (q.v.). Guericke's *De Vacuo Spatio*, a work in seven books, written in 1663, was published in 1672, and the third book, which contains an account of his experiments, was translated into German and published in Ostwald's *Klassiker*, No. 59 (Leipzig, 1854). Guericke's name is also associated with the beginnings of scientific investigation in the field of electricity. In his experiments he applied friction to a sphere of sulphur. Consult F. W. Hoffmann, *Otto von Guericke* (Magdeburg, 1894).

GUÉRIN, gȧ′răɴ′, Georges Maurice de (1810–39). A French poet. He was born in Languedoc, entered the Church, and became a member of the religious community of Lamennais (q.v.) at La Chesnaye. In 1838 he was appointed an instructor in the Collège Stanislas, Paris. His poems were collected in 1860 as *Reliquiæ*, edited by Trébutien, with a critique by Sainte-Beuve. His genius was exceptional, its most distinctive characteristic being its comprehensive view of nature.—His sister Eugénie (1805–48) was remarkable for her brilliancy and for her devotion in caring for him. Her *Journals and Letters* (1862) are charming in style and reveal her saintly spirit. Consult: Matthew Arnold, *Essays in Criticism*, vol. i (London, 1902); Harriet Parr, *Maurice and Eugénie de Guérin* (ib., 1870); A. Lefranc, *Maurice de Guérin* (Paris, 1910).

GUÉRIN, Jules (1866–). An American painter and illustrator, born in St. Louis, Mo. He studied under Jean Paul Laurens and Benjamin Constant in Paris, and his work shows distinct traces of their schooling. His pictures are usually of architecture or landscape —frequently a combination of the two—his method being to diminish as much as possible effects of chiaroscuro and render his subject in very flat masses of color, producing a decorative effect somewhat analogous to that of the later Japanese artists. The result is well suited to the reproductive processes of the magazines, for which much of his work was done. He was elected a member of the National Institute of Arts and Letters and received awards at the expositions of Chicago, Paris, Buffalo (1901), and St. Louis (1904). In 1914 he had charge of the decorations of the Panama-Pacific Exposition (San

Francisco), for which he made an elaborate color scheme.

GUÉRIN, Pierre Narcisse, Baron (1774–1833). A French historical painter. He was born in Paris, was a pupil of Jean Baptiste Regnault (q.v.), and painted in the classical manner of David. His works are good in line, but cold in color and sentiment. The best of them, the "Return of Marcus Sextus" (1799), in the Louvre, is of unusual pathos. Others are: the "Offering to Æsculapius" (1802); "Pyrrhus and Andromache"; "Æneas and Dido" (1813); "Clytemnestra" (1817)—all in the Louvre; and "Napoleon Pardoning the Rebels in Cairo," at Versailles. Guérin was named member of the Institute and of the Order of St. Michel in 1819, director of the French Academy at Rome in 1822, Baron in 1829, and Officer of the Legion of Honor in 1832. Among his pupils were Géricault and Delacroix (qq.v.).

GUÉRIN DE TENCIN. See Tencin.

GUÉRIN-MENEVILLE, mȧ′n′-vĕl′, Félix Edouard (1799–1874). A French naturalist, born at Toulon. A pupil of Cuvier, Geoffroy Saint-Hilaire, and Latreille, he became professor of entomology in the College of France in 1850 and was specially famed for his scientific investigations into the proper methods for raising silkworms. He wrote largely upon the subject for the different societies to which he belonged, and published, besides: *Iconographie du règne animal de Cuvier* (7 vols., 1830–44); *Genera des insectes* (1835), with Percheron; *Guide de l'éleveur de vers à soie* (1856); *Production de la soie, situation, maladies et amélioration des races du ver à soie* (1857); *Notes sur les éducations pour graine qu'il conviendrait de faire pour atténuer les désastreux effets de l'épizootie des vers à soie* (1857).

GUERNSEY, gẽrn′zĭ. The second in size of the Channel Islands (q.v.), distant 69 miles southeast from Start Point, Devonshire—the nearest point of the English coast and about 46 miles southwest of Cherbourg, France (Map: France, N., C 3). Its length is 9 miles, its greatest breadth 5, and its area 19 square miles. The northern part of the island is flat, the southern more elevated, intersected by deep valleys and glens, and with a lofty, picturesque coast. The interior is generally rolling and fertile; about two-thirds of the soil is arable. St. Peter Port and St. Sampson, connected by the first-built English electric trolley line, are the chief towns. St. Sampson is an important quarrying centre for blue granite. The island is famous for its cattle. There is a United States consular agency on the island. Pop. (including outlying small islands), 1901, 43,042; 1911, 44,997.

GUERNSEY, Egbert (1823–1903). An American homeopathic physician, born at Litchfield, Conn. He entered Yale College in 1842, but came to New York and graduated in medicine from New York University in 1846. He then began practice in Williamsburg (now a part of New York City) and was soon appointed city physician. In 1848 he started the Brooklyn *Daily Times* and was for two years its editor in chief. The teaching of Hahnemann was then exciting great interest in this country, and Guernsey became a convert to, and prominent exponent of, the homeopathic system of practice. He began to practice in New York City in 1850 and was identified with the New York Homeopathic Medical College as professor first of materia medica and then of practice. His book on *Domestic Practice* (1855) has passed through several editions and was translated into French, Spanish, and Danish. In 1852 he edited, with Dr. A. Gerald Hall, *Jahr's Manual*, and in 1872 he established the New York *Medical Times* and was its editor in chief till his death. In 1870 he organized the Western Dispensary, since united with the Hahnemann Hospital as the "Guernsey Maternity." In 1877, through his efforts, the inebriate asylum on Ward's Island, New York City, was converted into a general hospital (the Metropolitan) and placed in the hands of the homeopathic school of practice, Guernsey being its president until his death. Besides the writings mentioned above, Guernsey was a voluminous writer and the author of an elementary history of the United States widely used in public schools.

GUERNSEY CATTLE. See Cattle.

GUERNSEY LILY. See Amaryllis.

GUÉROULT, gȧ′ro͞o′, Adolphe (1810–72). A French publicist, born at Radepont (Eure). He became known as an exponent of Saint-Simonist principles and wrote articles on economic subjects for the *Journal des Débats* and other periodicals. Subsequently he was correspondent of the *Débats* in Italy, in 1842 was appointed French Consul at Mazatlan, Mexico, and in 1847 at Jassy, Rumania. He was variously active as a journalist in Paris from 1848 to 1857, when he became editor in chief of *La Presse*. In 1859 he founded *L'Opinion Nationale*, which under his direction attained conspicuous influence as the advocate of Democratic measures under Imperial rule. From 1863 to 1870 he was a member of the Corps Législatif, in which he acted with the Left Centre, or Democratic opposition. After Sept. 4, 1870, he declared for the Republic. His publications include the *Lettres sur l'Espagne* (1838), originally contributed as a series to the *Débats* during a residence in Spain; *De la question coloniale* (1842); *Etudes de politique et de philosophie religieuse* (1862); *La politique de la Prusse* (1866); *Discours prononcés au Corps législatif* (1866); *La République en France* (1871).

GUERRAZZI, gwĕr-rät′sē, Francesco Domenico (1804–73). An Italian statesman and writer, born at Leghorn and educated for the legal profession. He early came under the Byronic influence. For the liberal opinions enunciated in his *Elogio di Cosimo del Fante* he was sent to Montepulciano (1828). There he wrote *La serpicina*, a little essay delightful in style, intended to prove that man is in every way inferior to the brutes. In 1829 he was associated with Mazzini and Bini in the establishment of the *Indicator Livornese*, a liberal organ which was soon suppressed. He was imprisoned in 1831 and again in 1834, when he was taken to Portoferraio. At this place he employed his time in writing the *Assedio di Firenze*, an historical novel, his best-known work, alive with patriotic fervor. This book exercised a deep influence on the generation which fought the battles of 1848. In January of this year he was again incarcerated for a few months. On the eve of the definite breach between the people and the Grand Duke of Tuscany, in 1849, Guerrazzi was induced to accept office in the ministry. On the flight of the Grand Duke he was proclaimed member of the provisional government and subsequently dictator. During this crisis of the state he preserved the strict autonomy of Tuscany until the return of the grand-ducal rule, when he was immediately seized and imprisoned on the ground of having neglected due measures of repression when the revolution first gathered strength during his ministry. His defense, entitled *Apologia della vita politica di F. D. Guerrazzi,* published at Florence (1852), is a masterpiece. After an imprisonment of three years he was condemned to the galleys, but was subsequently permitted to select Corsica as the refuge of his perpetual banishment. Restored to liberty and action by later events, Guerrazzi sat in the Parliament of Turin in 1862 and 1865. His language is of the purest Italian, but his style is often bitterly intemperate—Byronic in its impulsiveness and frequently bombastic. Among his novels are: *La battaglia di Benevento,* his first important production, praiseworthy for its narrative style; *Veronica Cybo; Isabella Orsini* (1844); *Marchese di Santa Prassede* (1853); *Beatrice Cenci* (1854); *La torre di Nonza* (1857); *Pasquale Paoli* (1860), a work excellent in tone and treatment, dealing with the fall of Corsica. The later novels, like the *Assedio di Roma* (1864), show decline in power. Conspicuous among his other writings are the *Scritti,* published at Florence (1847), containing the mordant satire, *I nuovi Tartufi;* the *Discorso al principe e al popolo* (1847), in which he demanded a constitution for the country; the *Asino* (1857), with a subject like that of *Serpicina;* and the *Vita di Andrea Doria* (1863). In 1844 he collected and published, at Florence, four *Orazioni funebri d' illustri Italiani,* and in 1848 printed his *Memorie.* Consult the editions of Guerrazzi's *Lettere,* by Carducci (Leghorn, 1880–83) and by Martini (Turin, 1891); Bosio, *Opere, Vita di Guerrazzi* (Milan, 1877); Vismara, *Bibliografia di Guerrazzi* (ib., 1880); Fenini, *Guerrazzi, studi critici* (ib., 1873); Ricucci, *Guerrazzi, Leopardo, Mazzini: Studi* (Naples, 1899).

GUERRERO, gâ-rā′rō. One of the Pacific states of Mexico, bounded by the states of Michoacan, Morelos, Mexico, and Puebla on the north, Oaxaca on the east, and the Pacific on the southwest. Its area is 24,996 square miles (Map: Mexico, J 9). With the exception of the coastal zone, about 20 miles wide, where the land rises gently, the surface is rough and mountainous. The Sierra Madre del Sur, rising to an altitude of over 9000 feet, traverses the whole length of the state parallel with the coast. It sends out numerous lateral spurs, inclosing narrow valleys through which small streams run south into the Pacific and north into the Río de las Balsas, also called Río Mexcala, the only large river of Guerrero. Its valley, separating the Sierra Madre del Sur from the main range of the Sierras, occupies the north half of the state. The climate is very hot and unhealthful in the coast lands, where fevers and leprosy prevail to a great extent; but the uplands enjoy a temperate, dry, and healthful climate. There is an extensive region of agricultural land, but its cultivation is greatly impeded by the sparseness of population. The chief agricultural products are cereals, fruits, tobacco, coffee, cacao, vanilla, and cotton. The mineral deposits are believed to be extensive, but thus far relatively little has been done towards their exploitation, although considerable quantities of silver have been mined. There is direct steamship communication between the port of Acapulco (q.v.) and foreign countries, and the Cuernavaca branch of the National Railways has been extended through the state as far as Balsas. The population in 1910 was 594,278, largely aboriginal Indians. The capital is Chilpancingo, a small town in the centre of the state, situated about 200 miles from the city of Mexico and about 110 miles from the coast. It is well built and lighted by electricity and had in 1910 a population of 7994.

GUERRERO, VICENTE (1782–1831). A Mexican revolutionary leader. He was born at Tixtla and spent his youth upon a farm. In October, 1810, he joined the revolutionary army under Morelos and distinguished himself by his energy and valor. In 1818, when all opposition to the Spanish power seemed extinct, he won two victories over the viceregal troops and reorganized the republican movement. He became the recognized head of the Independents and established himself in the south, but was induced by Iturbide, in January, 1821, to join in the *Plan de Iguala,* by which Mexico was to become independent under a king of the Spanish royal family. Iturbide's assumption of the Imperial title alienated Guerrero, who became the leader of the opposition, and was in command at the battle of Almolonga, in January, 1823, in which he was severely wounded. When Iturbide left the country, Guerrero was made a member of the Executive Council of four, but his lack of education and his inexperience in politics prevented his exercising much influence in the government. From 1824 to 1828 he was Vice President of the republic. He was a candidate for the presidency in 1828 and was defeated. Thereupon his partisans rose in revolt and succeeded in forcing the legally elected candidate (Pedraza) to leave the country. The Congress elected Guerrero to the vacant office (March, 1829). The most important measure of his administration was the decree abolishing slavery (Sept. 15, 1829). The Spanish invasion of that year was repelled with ease, but the extraordinary powers conferred upon the President afforded a pretense for the formation of a revolutionary coalition, under the veteran intriguer Bustamente. Revolution broke out in December and gained ground with great rapidity. Bustamente assumed the office of President. Guerrero fled to the south and with Acapulco for a base of operations kept up an armed resistance until January, 1831, when he was betrayed into the hands of his enemies by a Genoese shipping captain. He was shot on Feb. 14, 1831, after a brief military trial.

GUERRILLAS (gĕr-rĭl′lȧz), or **GUERILLAS** (Sp., predatory war, dim. of *guerra,* war, from OHG. *werra,* strife, confusion). Bands of persons or individuals acting singly, who commit acts of hostility without the sanction or authority of their own government. They are not a part of the organized army, but intermittently return to their homes and vocations, thereby divesting themselves temporarily of the character and appearance of soldiers. If captured, they are not entitled to the privileges of prisoners of war, but are treated summarily as murderers and robbers. They should be distinguished from *partisans,* which are organized bands operating under a commission from their own government, and who, so long as they conform to the laws of war, enjoy the privileges and rights which those laws guarantee belligerents. Consult: *The International Peace Conferences* of 1899 and 1907 at The Hague; *In-*

structions for the Government of the Armies of the United States in the Field (Washington, 1863, 1898); *Rules for Land Warfare, United States Army* (ib., 1914).

The term "guerrilla" originally was applied to armed bands of Spanish peasantry who, favored by local conditions and the terrain generally, proved very effective against the French invasion which began in 1808. In the American Civil War the name was applied to various irregular bodies of Confederate troops. Similarly the francs-tireurs (q.v.) of the Franco-German War were practically guerrillas. The Spanish employed some few guerrillas against the United States in Cuba in 1898, and the closing stages of the British-Boer War were devoted, on the Boer side, to guerrilla tactics, carried out by small bands of armed Boers. Filipino and Moro guerrillas were active for several years during the pacification of the Philippine Islands by the United States forces. The marauding bands of murderers and robbers operating all over Mexico in the vicinity of the Federal and Constitutionalist forces during the revolution (1911–15) are further typical examples of guerrillas.

GUERRINI, gwĕr-rē′nė, Olindo (pseudonym, Lorenzo Stecchetti) (1845–). An Italian poet and miscellaneous writer, born at Sant' Alberto (Province of Ravenna). He studied law at the universities of Turin and Bologna, but never practiced. In 1868 he began to occupy himself with literature and research and was appointed librarian of the University Library at Bologna. His publications include: *Postuma: Canzoniere di Lorenzo Stecchetti* (1877); *Polemica* (1878); *Studi e polemiche Dantesche* (1880); *Canti popolari romagnoli* (1880); *Rime di tre gentildonne del secolo XVI* (1882); *Brandelli* (1884); *Il libro dei colori* (with Ricci, 1887). He wrote many humorous poems in Venetian dialect, among the best of which is *Bepi*. In 1903 appeared *Rime di Lorenzo Stecchetti.* He is the chief representative of "verism" in modern Italian lyric poetry, which is shown in his *Rime di Argia Stolenfi.*

GUESCLIN, gå′klăɴ′, Bertrand du. See Du Guesclin, Bertrand.

GUESDE, gĕd, Jules Basile (1845–). A noted French Socialist leader, born in Paris, Nov. 11, 1845. Like many other French politicians, he began his career as a journalist. In 1870 he founded a radical paper called *Les Droits de l'Homme,* in which he vigorously espoused the Commune. For this he suffered imprisonment and exile, and for five years he led the life of a wandering agitator. While in Germany, his radical opinions became definitely socialistic, and he returned to France, not only a strict adherent of Karl Marx, but full of admiration for the unity and discipline of the German Social Democratic party. It now became his great ambition to organize in France a powerful, united, and well-disciplined Socialist party unswervingly committed to the Marxian programme. With this object in view, he founded the weekly *Egalité,* in which he advocated his principles with great ability and singleness of purpose. Guesde's first struggle was with the semianarchistic followers of Blanqui, who favored insurrection and violence as a means of overthrowing present society. In 1878, the year of the Universal Exposition, the Socialists attempted to hold a convention in Paris, but the police broke up the meeting, and Guesde, who was the leader in this movement, was arrested. He aroused so much enthusiasm that the French workingmen rallied to his side, and in the following year the great Labor Congress of Marseilles indorsed the Marxian programme drawn up by Guesde and Paul Lafargue, son-in-law of Karl Marx.

French Socialists in the latter part of the nineteenth century were split up into numerous groups that were constantly quarreling with each other. Some were strictly Marxian and followers of Guesde, others called themselves "possibilists" or those who desired an opportunist policy which meant emphasizing Socialist doctrines less and progressive social reform more. Between the two there was constant war. Opportunism to Guesde spelled treason to Socialism for the sake of petty reforms. At the time of the Dreyfus affair many Socialists, led by Jean Jaurès (q.v.), became supporters of the radical ministry. A Socialist, Millerand (q.v.), even became a member of the cabinet. Guesde determined to bring the matter before the International Socialist Congress of Amsterdam in 1904. This he did, and the congress after a great debate officially supported Guesde's resolution that a Socialistic party must be independent of all other parties and not participate in a capitalist government. All true Socialists in France were told to unite in one party. In this way was born the Unified Socialist party, a powerful cohesive organization definitely committed to the Marxian programme, which elected in 1914 about 100 members to the Chamber of Deputies. Jaurès bowed to the decision of the Amsterdam Congress and continued as leader of the party; but the "possibilists," Millerand, Briand, and Viviani, refused, and they were consequently expelled from the organization.

After 1893 Guesde was almost regularly elected a member of the Chamber, where he exercised considerable influence. There is a touch of fanaticism in his intellectual rigidity, for he is a stern unbending Marxist and believes firmly in the coming of a Socialist régime. The great European War of 1914, which threatened the existence of France, alone had the effect of changing the uncompromising attitude of Guesde. In a public statement he declared that Germany was a traitor to the peace of Europe and had endangered the existence of civilization; he also denounced the German Socialists as "traitor workmen." He entered the cabinet of M. Viviani (as Minister without portfolio). Consult: R. Hunter, *Socialists at Work* (New York, 1908); S. P. Orth, *Socialism and Democracy in Europe* (London, 1913); J. S. Schapiro, "The Drift in French Politics," in *American Political Science Review* (Baltimore, August, 1913).

GUESS, gĕs, George. See Sequoya.

GUESS WARP. A hawser paid from a ship by rough estimate of its sufficiency. In carrying out a hawser in a boat from a ship to a distant object, if the boat is small, or if in haste, only part of the hawser is put in the boat, which drags the hawser from the ship until, in the judgment ("guess") of the officer or petty officer in charge of the boat, he can reach his destination with what he has in the boat.

GUEST, gĕst, Edwin (1800–80). An English scholar. He graduated at Cambridge, where he became fellow of Caius College in 1824 and vice chancellor in 1854. He was one of the founders of the Philological Society (1842), to which he contributed numerous papers. His work in philology has been largely superseded, but his *History of English Rhythms* (2 vols., 1838; ed. by Skeat, 1882) is still valuable. He was a pioneer in the study of ancient Britain. Some of his investigations in the field were collected by W. Stubbs under the title *Origines Celticæ* (1883).

GUEST, John (1821–79). An American naval officer, born in Missouri. He entered the navy in 1837 and in 1866 rose to be captain. During the Mexican War he served along the west coast of Mexico and the California coast, and in 1854, while at Shanghai in command of the seamen and marines of the steamer *Plymouth*, won a decisive victory over a force of Chinese rebels who were seeking to plunder foreign residents. In the Civil War he commanded the *Owasco* in the passage of Forts Jackson and St. Philip, and the *Lehigh* and *Itasca* in the battles of Fort Fisher. He was promoted in 1873 to be commodore and was in command of the Portsmouth Navy Yard at the time of his death.

GUEUX, Les, lȧ gẽ (Fr., beggars). The name assumed by the confederated nobles who opposed the tryannical policy of Philip II of Spain in the Low Countries and brought about the revolt which separated the Northern Provinces from Spain. Philip having followed up his previous policy of severity and persecution by sending inquisitors to the Low Countries to put into execution the decrees of the Council of Trent, provoked by this act the bitter resentment of the patriotic party, who saw in it an attempt to curtail their ancient liberties. An opposition was thus formed, which, headed by Count Louis of Nassau and Count Hendrik van Brederode, declared in an act called the "Compromise" (April 5, 1566) their fixed determination to ignore the authority of the inquisitors. On one occasion, after listening to a deputation from the liberal party, the Regent, Margaret of Parma, it is said, seemed inclined to yield to their demands, when one of her council approached her and whispered that she "need not be afraid of these gatherings of beggars." The remark having been overheard by some of the deputation, the epithet was soon afterward assumed as the title of the patriotic league. The "beggars" maintained a long and vigorous contest against the despotic proceedings of Philip and his advisers. A branch of them, the "sea beggars," under the bold leadership of Count de la Marck, initiated the long struggle for independence by the capture of Brill, April 1, 1572. The record of their struggles is a glorious one. After many reverses and few successes the tide turned in their favor. From the date of the Union of Ghent (1576) the history of the Gueux is merged in that of the Netherlands. Consult: Kervyn de Lettenhove, *Les huguenots et les gueux* (6 vols., Brussels, 1882–85); Renon de France, *Histoire des causes de la désunion . . . des Pays-Bas* (3 vols., Brussels, 1886–91); Jurien de la Gravière, "Les gueux de mer," in *Revue des Deux Mondes* (Paris, 1891–92); also the general works of Motley, Blok, and others, mentioned in the article on the Netherlands.

GUEVARA, gȧ-vä′rȧ, Antonio de (c.1490–1545). A Spanish writer, born in Treceño, Santander. As a boy, he was taken to the court of Ferdinand and Isabella, and after the Queen's death he entered the Franciscan Order. He served as guardian at Arévalo and Avila, and in 1518 was made court preacher and historiographer by Charles V. After visiting England and Germany, he was appointed inquisitor in 1523 and took part in the forcible conversion of the Moors. In 1527 he was named Bishop of Guadix. He accompanied Charles V on his expedition to Tunis (1535), and on other travels in Europe. Returning to Spain, he died at Mondoñedo. He enjoyed great favor in his own time, both at home and abroad, for the peculiarly artificial style of his didactic and political treatises, which are marked also by decidedly moralizing tendencies. This rhetorical manner of Guevara prevailed in his *Marco Aurelio con el reloj de princípes* (1529), which, translated into English—*The Golden Book of Marcus Aurelius, Emperor and Eloquent Orator*, translated from the French by Lord Berners (London, 1532); and again, *The Diall of Princes, Englysshed oute of the Frenche*, by Thomas North (London, 1557; cf. a later ed., London, 1619)—first made known in England the literary mannerisms and affectation which in Lyly's hands became euphuism. Like the other productions of Guevara, this work was frequently translated into French, and from it, through an interesting French translation, La Fontaine derived the subject matter for his fable *Le paysan du Danube* (libre xi, fable 7). When publishing the *Reloj*, Guevara pretended that it was a genuine autobiography of Marcus Aurelius, and that the original manuscript was to be found at Florence. This fraud was detected and made known in 1540, by Pedro de Rua, a professor at Soria, and Guevara had to admit his authorship. The proceeding was the occasion of undue strictures upon him on the part of several critics. His other productions comprise a volume (Valladolid, 1539) containing *Década de las vidas de los X. Césares, emperadóres romanos, De menosprecio de la corte, Aviso de privádos y doctrina de cortesános*, and *De los inventores del marear; Epístolas familiares* (Valladolid, 1539); and two devout treatises, *Monte Calvario* (1542) and *Oratório de religiósos* (1543). Of these the *Epístolas familiares* became the most famous, and were widely read for the sake of their refined diction, which for us is overwrought and absurdly pompous. Among the English translations of the *Epístolas*—called generally the "Golden Epistles," so great was their vogue—may be noted that of E. Hellowes (London, 1574) and that of G. Fenton (ib., 1575).

Bibliography. *Biblioteca de autores españoles*, vol. xiii (Madrid, 1850), contains his "Epístolas familiares," and vol. lxv (ib., 1873) a number of philosophical writings; consult also Gálvez, *Guevara in England* (Weimar, 1910).

GUEVARA, Luis Vélez de. See Vélez de Guevara, Luis.

GUEVI, gwā′vē (South African name). The pigmy antelope. See Bluebuck; Duiker; Antelope.

GUGGENHEIM, gṳg′*en*-hīm, Benjamin (1855–1912). An American capitalist, son of Meyer Guggenheim. When only 20 years old, he was sent to Denver, Colo., to take charge of the mining interests of his father in that city. He had charge of the first smelter built by his family at Pueblo, Colo., and subsequently took charge of the smelting plant at Perth Amboy, N. J. In 1903 he erected at Milwaukee a plant for making machinery, later merged in the International Steam Pump Company, of which he became president in 1909. With his brothers Benjamin Guggenheim was in control of the

American Smelting and Refining Company. He was one of those lost in the *Titanic* disaster.

GUIANA, gē-ä′nȧ. A territory in the northeast part of South America, bounded by the Atlantic on the north, by Brazil and the Atlantic on the east, and by Brazil and Venezuela on the west (see accompanying map). Its area is estimated at 166,800 square miles. (Brazilian Guiana, lying on the south, is sometimes embraced under this general heading.) Guiana has not been thoroughly explored. Its surface may be described, on the whole, as a plateau rising towards the west and north, with an average elevation of about 3200 feet. The mountains have nowhere been found to rise higher than the peak Roraima (8600 feet). This mountain is on the west boundary and belongs to the Pacaraima Range. Along the southern border of Guiana is the low Tumuc Humac Range. The coast is level and low, and dikes keep back the ocean at many points.

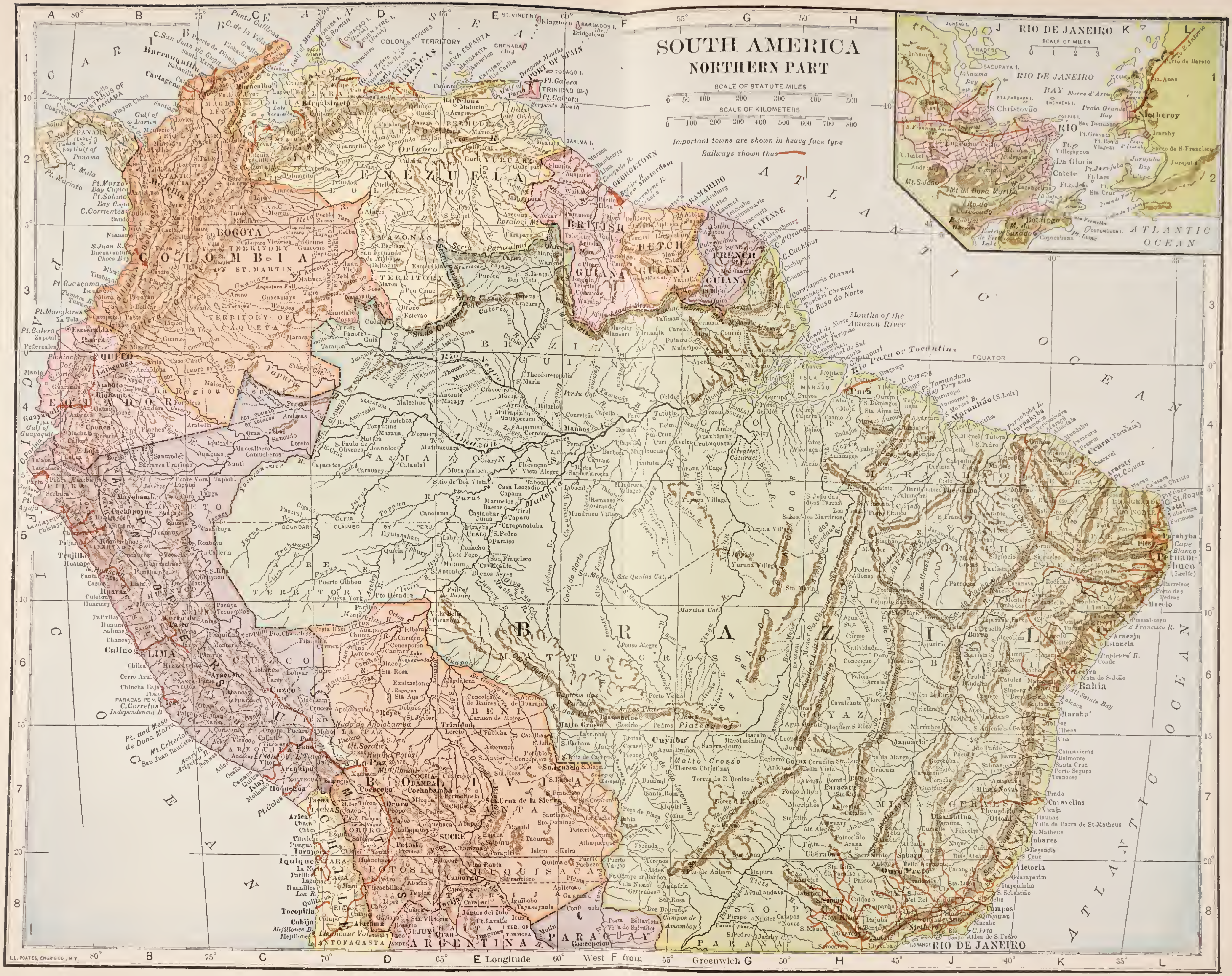
Guiana is well watered, numerous rivers coursing through it northward to the sea. The most important of them are the Essequibo (600 miles in length, the longest river in Guiana), Mazaruni, Berbice, Corentyn, and Maroni (400 miles). Owing to numerous rapids and falls, they are navigable only for comparatively short distances. Of the many fertile valleys, none has any considerable extent except the depression lying between the Essequibo and the Corentyn. Little is known of the geology of Guiana, except in the southern part, near the Brazilian boundary, where valuable deposits of gold have given an impetus lately to geological exploration. In this region gneisses and granites are found to underlie heavy beds of sandstone and other stratified rocks of undetermined age.

The climate is tropical. Owing to the intense heat and humidity along the coast, the northern portion of Guiana is particularly unhealthful. Both here and up along the rivers fevers have greatly interfered with the development of the country by Europeans. The climate of the upland interior is naturally more moderate and inviting. The rainy period extends from the last of April until the middle of August, during which time there is a very heavy precipitation. Along the coast there is a second and lighter rainy season from November to February. In the short dry periods of the year east winds prevail. Guiana is free from hurricanes. The vegetation is wholly equatorial. In the lower and northern sections heavy forests cover the land. They usually extend well up towards the higher parts. The forests, like the fauna, are similar to those of the Amazon region, possessing valuable medicinal and dye woods and the typical wild fruits of the torrid zone. The magnificent Victoria regia was first made known from the Berbice River. The plateau itself, so far as explored, is practically barren. The low, forest-covered lands are very fertile, but are surpassed in richness by the tide-irrigated coast strip. The cultivated land produces the usual tropical crops as well as some of a less torrid region. Among the larger animals may be mentioned the jaguar, sloth, tapir, ant eaters, capybara, and numerous monkeys (howlers, capuchins, marmosets). The boa, anaconda, and a number of venomous species represent the serpents.

Politically Guiana is divided into three countries—British, Dutch, and French Guiana.

British Guiana. This colony, a possession of Great Britain, forms the western part of Guiana. It is bounded on the west by Venezuela and Brazil, on the northeast by the Atlantic, and on the east by Dutch Guiana, being separated from the latter by the river Corentyn. It extends from east to west about 270 miles and from north to south about 540 miles. Its area is estimated at 90,277 square miles, being more than half that of all Guiana. Of British Guiana (quite the most important of the three colonies), only the alluvial stretch along the coast has been really developed. There are three settlements—Demerara, Essequibo, and Berbice—with Georgetown as the capital of the colony. Wood cutting is a leading industry. Gold production, which has declined in recent years, amounted in the fiscal year 1897 to 127,479 ounces, valued at £464,768; in 1900, 112,789 ounces, £411,211; in 1910, 64,830 ounces, £236,359; in 1912, 51,196 ounces, £190,733. Diamonds are also found, chiefly along the Mazaruni River. In 1913 there were under cultivation about 145,000 acres, of which about 68,400 acres were under sugar cane and about 41,900 acres under rice. Grazing has not become important; in 1913 cattle numbered 72,000. In the general trade imports and exports were valued in 1902–03 at £1,444,084 and £1,829,749 respectively; in 1911–12, £1,703,356 and £1,978,597 (£898,459 from, and £725,626 to, the United Kingdom). The principal export is sugar, valued in 1912 at £1,019,500. Other exports were: gold, about £177,000; rum, £149,000; balata, £101,500; rice, £38,700. About 40 per cent of the sugar goes to Great Britain and the United States. The imports consist principally of tissues, flour, manures, machinery, implements, etc. North America supplies the colony with fish. In 1911–12 the total tonnage entered and cleared was 988,663. The colonial fleet at the end of 1910 consisted of 58 vessels, of 3228 tons. Georgetown (q.v.) is the chief port; next in commercial importance is New Amsterdam, at the mouth of the Berbice. There is a railway from Georgetown to Rosignol, 60½ miles; from Vreeden Hoop to Greenwich Park, 15 miles; and from a point on the upper Demerara to the upper Essequibo, 18¾ miles. There are 450 miles of river navigation, 12 miles of canal, 264 miles of good roads, about 575 miles of telegraph line, and 74 post offices.

The colony is administered by a governor appointed by the crown. The governor is assisted by an executive council and by a court of policy, consisting of seven appointed and eight elected members, chosen by the registered voters (4050). Revenue and expenditure in 1902–03 amounted to £557,351 and £501,704 respectively; in 1911–12, £593,498 and £588,625; in 1912–13, £580,446 and £590,744. Public debt in 1913, £884,615. There are 49 post-office savings banks. British sterling and American gold coin are current and legal tender, as well as Spanish and Mexican gold. The population of British Guiana increased from 98,154 in 1841 to 135,994 in 1851; in 1871, 193,491; in 1891, 278,328; there was no census in 1901; in 1911, 296,041. These figures are exclusive of aborigines living in the inaccessible parts of the colony; they perhaps number about 10,000. Of the censused population in 1911, there were 126,517 East Indians, 115,486 negroes, 10,084 Portuguese and 3937 other Europeans, 6910 aborigines, and 2622 Chinese. Most of the remaining inhabitants were of mixed race. Males numbered 153,-

SOUTH AMERICA
NORTHERN PART
SCALE OF STATUTE MILES
0 50 100 200 300 400 500
SCALE OF KILOMETERS
0 100 200 300 400 500 600 700 800
Important towns are shown in heavy face type
Railways shown thus
RIO DE JANEIRO
SCALE OF MILES
0 1 2 3
RIO DE JANEIRO BAY
Nictheroy
RIO
ATLANTIC OCEAN
CARIBBEAN SEA
PACIFIC OCEAN
ATLANTIC OCEAN
EQUATOR
COLOMBIA
VENEZUELA
ECUADOR
PERU
BOLIVIA
CHILE
ARGENTINA
PARAGUAY
BRAZIL
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
BOGOTA
CARACAS
QUITO
LIMA
La Paz
Sucre
GEORGETOWN
PARAMARIBO
CAYENNE
Para
Manaos
Bahia
Pernambuco
Mouths of the Amazon River
Amazon
Rio Negro
Madeira
ISTHMUS OF PANAMA
PANAMA
TRINIDAD (Br.)
Longitude 60° West from Greenwich
L.L. POATES, ENGR'G CO., N.Y.

717, females 142,324, and natives of the colony 218,705. In 1912–13 there were 224 schools receiving government aid, with 36,148 pupils, and an average attendance of 22,624. The common language is English.

Dutch Guiana, or **Surinam.** This colony, belonging to the Netherlands, lies east of British Guiana and is bordered on the east by the Maroni River. Its estimated area is 49,845 square miles. Only the sea region is developed, the interior having been little explored. The coast is generally rather swampy. Its inhabited portions are protected and drained by dams and canals and are nowhere wider than 25 miles. Along the coast are fine mangrove forests. Among the plants exploited by the natives here and farther inland are manioc and several varieties of palms. Agriculture is almost the sole industry of the Europeans, sugar being the principal product. Cacao, bananas, rice, maize, and coffee are grown. In 1910 there were produced 121,791 metric quintals of sugar, 16,830 of cacao, 2023 of coffee, 13,233 of maize; 19,937 of rice, 10,898 hectoliters of molasses, and 8729 hectoliters of rum. There were under cultivation, in 1910, 11,994 hectares, of which 2411 were under sugar cane. In 1876 gold was discovered in the eastern part of the colony. Mining was not a little impeded by the dispute with France over the boundary. The question was finally settled in 1905. The gold output in 1910 was 1,081,476 grams, valued at 1,481,622 gulden. The export of gold in 1901 was valued at 991,562 gulden; in 1905, 1,402,176; in 1910, 1,446,073; in 1911, 1,271,437; in the period 1876–1911, 39,395,989. The development of commerce is shown in the following figures for imports and exports respectively: in 1870, 4,042,111 and 2,657,871 gulden; in 1880, 3,914,458 and 3,600,535; in 1890, 5,366,258 and 4,272,692; in 1900, 6,166,608 and 5,540,855; in 1910, 7,424,698 and 8,345,447; in 1912, 7,494,042 and 8,435,447. In 1910 imports from and exports to the Netherlands were valued at about 4,433,000 and 3,843,000 gulden respectively; United States, 1,666,000 and 2,381,000; other countries, 1,326,000 and 2,122,000. There entered at the ports, in 1910, 240 vessels, of 210,998 tons; in 1912, 237, of 211,214 tons. There are no railways and only a few miles of telegraph.

The colony has a governor, with a council of four members nominated by the Queen. The legislative body is the colonial assembly, or "states," the members of which are chosen for six years by electors in proportion of one in 200 electors. For 1914 the estimated revenue and expenditure were 7,051,799 and 6,261,533 gulden; subvention, 790,266 gulden. The population in 1906, exclusive of negroes and Indians living in the forests, was reported at 78,124; in 1910, 86,233. The latter figure included 52,369 aborigines, 19,183 British Indians, 7894 Dutch East Indians, 913 Europeans, and 5374 others. There were 46,037 males and 40,196 females. Paramaribo, with 35,346 inhabitants in 1910, is the capital and only important town. In 1911 there were 26 public schools, with 2965 pupils, and 40 private schools, with 6311 pupils. The official language is Dutch, but English is much used.

French Guiana. This colony and penal settlement of France lies between Dutch Guiana and Brazil, the river Oyapok being on the eastern border. Its area is estimated at 30,463 square miles. The surface rises quite gradually from the unhealthful coast to the mountain border on the south, where the highest point, however, does not reach above 2700 feet. The coast is not so low as that of British and Dutch Guiana. There are several rivers, but none of importance. Only a small part of the country is known. Fevers, particularly yellow fever, decimate the region and proved so fatal to French convicts that white prisoners have long been sent elsewhere. Less than 10,000 acres of land are under cultivation. The crops include rice, maize, coffee, sugar cane, tobacco, etc. The industrial growth of the colony is very slow and discouraging. There are but a few thousand head of live stock in the colony.

Gold mining is the leading industry, and gold is the chief article of export. Gold was discovered in 1853. In 1904 the product was 114,758 ounces; in 1912, 127,809 ounces. The development of this industry is much affected by the high rate of mortality. There is a little production of phosphate, silver, and iron. Some marble and balata and rosewood oil also figure in the list of exports. In 1890 imports and exports were valued at 7,890,000 and 4,309,000 francs respectively; in 1900, 8,953,000 and 6,497,000; in 1910, 12,223,000 and 11,567,000; in 1912, 10,905,000 and 12,117,000. Of the latter figure the gold export accounted for 10,457,000 francs. About three-fourths of the import trade and about one-half of the export trade are with France. A cable connects Cayenne with Brest.

The colony is administered by a governor, assisted by a privy council of five members appointed at Paris. The colony has a council general of 16 members, and sends one deputy to the French Chamber. The local budget for 1912 balanced at 3,592,000 francs; but a subvention from the home government is necessary. In 1901 there were 32,908 inhabitants, among whom were 4097 hard-labor convicts and 1885 native Indians; in 1911, 49,009. The convicts (about 4400 in 1912) are restricted to four localities. The Ile du Diable off the coast, northwest of Cayenne, became famous through the imprisonment there of Alfred Dreyfus. Cayenne, the capital and the only important town, had 13,527 inhabitants in 1911. The group of islands called the Iles du Salut (of which the Ile du Diable is one) form a desirable harbor. In 1912 there were 26 schools, with 2796 pupils. There is a college at Cayenne.

History. The coast of Guiana was first visited in 1499 and 1500 by Ojeda, Vespucci, and Pinzon. The Spaniards planted a few settlements in the region, none of which seem to have had any long existence. Missionaries visited the interior during the sixteenth century. The tales of El Dorado aroused interest in this corner of South America, but the main current of settlement and exploration was along the Orinoco and to the westward of modern Guiana. Raleigh, who first made the name widely known in 1595, confined his operations almost entirely to the river, although his sailing masters in 1594 and succeeding years carefully explored the coast to the east. After the formation of the Dutch West India Company in 1621, the Dutch, who had established trade on the Pomerun River as early as 1581 and had explored the Guiana coast more fully in 1597 and 1598, gained a permanent foothold at the head of the Essequibo Delta, where a settlement had been existing since 1613. In 1648 the Treaty of

Westphalia confirmed the Dutch West India Company in possession of the territory. Meanwhile the French had settled near Cape Orange, and the English near the mouth of the Surinam. In 1667 this English colony was exchanged with Holland for New Netherlands or New York. Things remained in much the same condition until 1803, when England captured Demerara, Berbice, and Essequibo from the Dutch, who formally surrendered them by treaty in 1814. The three colonies, comprising some 76,000 square miles, were consolidated in 1831. The boundary between British Guiana and Venezuela (q.v.) ceased to be a subject of dispute after the arbitration Treaty of 1897. The boundary between French Guiana and Brazil was determined in 1900, between British Guiana and Brazil in 1904, and between French and Dutch Guiana in 1905. In the latter year negro riots occurred at Georgetown, due to strikes for higher wages. These were quickly suppressed by the government, but showed the desperate character of the easily excited low-class colored population.

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GUIANGA, gē-än′gȧ, **GUANGA**, gōō-än′gȧ. See Bagobo.

GUIB, gwĭb (African name). One of the "harnessed" antelopes, or bush bucks (*Tragelaphus scriptus*), of southeastern Africa, which formerly were extremely numerous and are still scattered from Abyssinia to the Cape. It is the smallest of the genus, not larger than a goat in size, and shows a great variety of coloration, which varies from dark brown to pale rufous, irregularly streaked and spotted with white. It keeps near the watercourses, hiding in dense thickets. See Plate of Gazelles.

GUIBERT DE NOGENT, gē′bâr′ de nō′zhäN′ (1053–c.1124). A French historian and prominent churchman of his day, born near Clermont (Oise). He is said to have been instructed by St. Anselm and became abbot of Notre Dame de Nogent in 1104. His principal work is the history of the First Crusade, written probably about 1108–12. He wrote also an autobiography and several other works, among which the most prominent are *De Vita Sua, sive Monodiarum* and *De Pignoribus Sanctorum*, a satire on saints and relic worship. A complete edition of these was issued in 1651. Consult P. Bourgin, *Guibert de Nogent: Histoire de sa vie* (Paris, 1907).

GUIBERT, gē′bâr′, or **WIBERT**, vē′bĕrt, **OF RAVENNA** (c.1020–1100). Antipope with the name Clement III (1080–99). He was born between 1020 and 1030 and in 1073 became Archbishop of Ravenna. He quarreled with Gregory VII (q.v.), by whom he was suspended in 1075 and excommunicated in 1078. In 1080 the Emperor Henry IV (q.v.) had him chosen Pope in opposition to Gregory at Bixe, and he was enthroned at Rome four years later, after the Emperor had captured the city. After the death of Gregory Guibert contested the papal see with Victor III and Urban II. In 1099 he made his submission to Paschal II. Consult his life by Köhncke (Leipzig, 1888).

GUICCIARDINI, gwē′chär-dē′nė, Francesco (1483–1540). An Italian statesman and historian, born of noble parentage at Florence. The studies of law and literature engrossed his earliest attention, and before he reached the age of 23 he was elected professor of law by the signoria of Florence. His knowledge of international law and his tact in the conduct of public affairs caused him to be selected in 1512 by the signoria as Ambassador to the court of Ferdinand, King of Aragon. During a period of two years he discharged his diplomatic duties with ability. In 1515 he was dispatched by the Republic of Florence to receive at Cortona Pope Leo X. This pontiff at once secured Guicciardini's services and committed to him the government of Modena and Reggio and finally of Parma. Under Clement VIII he was for some years Governor of the Romagna and finally of Bologna. On the accession of Paul III (1534), Guicciardini resigned all his dignities and returned to Florence, where Alexander de' Medici had been made sovereign by Charles V. On the assassination of Alexander, Guicciardini promoted the elevation of Cosimo de' Medici; but, meeting with no special favor from that prince, he withdrew to his villa at Arcetri, where he began his famous work *La storia d' Italia*, the greatest historical work of the sixteenth century. He died before its completion. In 1561 the first 16 books of his history were published at Florence, and three years later, at Venice, four additional books appeared. The work is a standard of classical historical writing, aside from its value as a minute and faithful record of the period it embraces (1490–1534). A magnificent Italian edition was published at Freiburg (1775–76), and another at Pisa in 1819, edited by Rosini. An earlier work was the *Storia fiorentina* (1509), dealing with the history of Florence from 1378 to 1509; it is marked by an impartial and keenly searching spirit, although written at the age of 26. Between 1523 and 1527 he wrote *Del reggimento di Firenze*, a most interesting discussion of city government. Guicciardini is always remarkable for the exactness of his observation and his unflinching common sense. He codified the political ideas of the sixteenth century. From 1857 to 1867 there appeared at Florence *Opere inedite di Francesco Guicciardini*. Consult: Benoist, *Guichardin, historien et homme d'état* (Paris, 1862); Gioda, *Guicciardini e le sue opere inedite* (Bologna, 1880);

Rossi, *Francesco Guicciardini e il governo fiorentino dal 1527 al 1540* (ib., 1896); Zanoni, *Vita pubblica di Francesco Guicciardini* (ib., 1890).

GUICCIARDINI, Francesco, Count (1851–1915). An Italian statesman, descended from the sixteenth-century historian of the same name. He was educated at the University of Pisa and in 1882 was elected to the Lower House. In 1884 he became General Secretary for Agriculture, Commerce, and Trade; in 1896–97 was Minister of Agriculture in Rudini's cabinet; and in 1906 and 1909–10 was Minister of Foreign Affairs in Sonnino's cabinet. For many years he was vice president of the House of Deputies, of which he was a member uninterruptedly after 1892.

GUICCIOLI, gwē-chō′lē, Teresa, Countess (1801–73). The daughter of Count Gamba of Ravenna, married when 16 to Count Guiccioli, who was over 60. She is known to fame from her intimacy with Lord Byron in 1819–22. In 1851 she married the Marquis de Boissy. She wrote a defense of Byron, entitled *Lord Byron jugé par les témoins de sa vie* (1868), known in its English translation as *My Recollections of Lord Byron* (1869). See also Byron, G. G.

GUICHARD, gē′shär′, Karl Gottlieb, better known as Quintus Icilius (1724–75). A German soldier and writer on military affairs, born in Magdeburg. He studied for the ministry, but his mind turned to military affairs and ancient history. In 1757 he published his *Mémoires militaires sur les Grecs et les Romains.* At the outbreak of the Seven Years' War he enlisted in the army of Duke Ferdinand of Brunswick, and in 1758 was presented to Frederick the Great, to whose personal service he was forthwith attached. It was at Landshut in May, 1759, that Frederick referred to a certain centurion mentioned in Polybius' account of the battle of Pharsalus as Quintus Icilius. Guichard ventured that the name was Quintus Cæcilius, persevered in his correction, and next day appeared with the text of Polybius in confirmation. "So?" retorted the King. "Well, then, Quintus Icilius shall be *your* name!" From that time Guichard appeared as Quintus Icilius in all lists and reports. He became major in 1758 and after the conclusion of the war was retained at Potsdam, where he was promoted to be colonel. He published further, *Mémoires critiques et historiques sur plusieurs points d'antiquités militaires* (1773). Consult Carlyle, *History of Frederick the Great* (London, 1858–65).

GUICHE, gēsh, Diane d'Andouins, Countess of (1554–1620). A mistress of Henry IV of France, daughter of Paul d'Andouins. She studied under the same tutors as the famous King and was his favorite playmate in their early youth. In 1567 she married Philibert de Gramont, Count of Guiche. About 1580 Montaigne dedicated some sonnets to her, and about that date the *belle Corisande,* as she was called, again met the King, who wished to marry her after her husband's death at La Fère (1580). During Henry's bitter war against the Liguers, led by the Duke of Guise, she was his most sagacious and trustworthy adviser. Henry's letters to her are included in his published correspondence, *Recueil des lettres missives de Henri IV* (9 vols., Paris, 1843–76).

GUIDE (OF. *guis,* Fr. *guide,* from OF. *guier, guider,* Fr. *guider,* to guide, probably from Goth., AS. *witan,* OHG. *wizzan,* Ger. *wissen,* to know, Lat. *videre,* to see, Gk. *εἰδέναι, eidenai,* Skt. ***vid,*** to know). A military term, denoting the non-commissioned officer detailed to regulate the pace and direction of bodies of troops during parade, drill, or evolutions. It also describes the person, civil or military, intrusted with the responsibility or duty of leading troops through a strange country or during night operations. In the French army the Guide Corps of cavalry and infantry form an important branch. The corps of guides of the British Indian Punjab frontier force consists of six troops of cavalry and eight companies of infantry, composed of native rank and file, and also, with the exception of 14 Europeans, of native commissioned officers. The French Guide Corps was first formed in 1744 as a small company of messengers on active service, but the number increased rapidly, until Napoleon finally formed them into a corps 10,000 strong.

GUIDERIUS, gwĭ-dē′rĭ-ŭs. A long-lost son of Cymbeline, in Shakespeare's romantic comedy of that name.

GUIDGUID, gwĭd′gwĭd, or **GUITGUIT.** An imitative name given in tropical America to almost any small bird having a quickly repeated cry, especially the creepers of the genera *Cœreba, Dacnis,* and the like. It is also used of members of the family Pteroptochidæ, which consists of many species of small, plainly colored, wren-like birds which spend their time and seek their insect food on the ground in the forest. A Chilean species (*Hylactes megapodius*) is very well known as "elturco."

GUIDI, gwē′dē, Carlo Alessandro (1650–1712). An Italian poet, born at Pavia. Literature, especially poetry, engrossed his earliest attention; and he strove to imitate Pindar. To his first pieces he owed the notice of the Duke of Parma, whose favor he further secured by his talent in setting his verses to airs of his own composition. In 1685 he went to Rome, where he won the friendship of Christina, Queen of Sweden, and composed at her request the pastoral drama *Endimione;* he was one of the first members of the Arcadia. His subject matter is always conventional, and his treatment of it usually artificial, but the workmanship of his verse is admirable. Guidi adopted a free form of canzone, later developed by Leopardi. His *Rime* appeared at Parma in 1681. Consult: Martelli, in *Vite degli Arcadi,* vol. iii (Rome, 1714); Crescimbeni, in *Poesie di A. Guidi, non più raccolte* (Verona, 1726); G. Capsoni, *Alessandro Guidi* (Pavia, 1897).

GUIDI, Ignazio (1844–). An Italian Orientalist. He was born in Rome, was educated there in the Liceo San Apollinare, and in 1878 became professor of Semitic languages in the University of Rome. He edited and translated Arabic, Syriac, Ethiopic, and Coptic texts, notably the earliest fragments of Amharic (q.v.); and is particularly known for his theory that the original home of the Semites was on the lower Euphrates. He received an honorary doctor's degree from Berlin.

GUIDI, Tommaso. See Masaccio.

GUIDICCIONI, gwē′dē-chō′nē, Giovanni (1500–41). An Italian prelate and poet, born at Lucca. His integrity and force of character played an important part in the diplomatic relations of his country. As President of the Romagna and Governor of the Marches, he freed these regions from the bandits infesting them. His love poems are of little value, but where his strong feeling for his country is shown, as in the sonnet beginning "The Arne, and the Tiber, and the Po," his verse is very noble. His complete works were published in 1718, and his *Lettere inedite* in 1865. The *Lettere di negozi* are particularly interesting historical documents. Consult C. Minutoli, *Opere di Mons. G. Guidiccioni* (Florence, 1867), and Fornaciari, *Una fenice fra i letterati del cinquecento* (ib., 1873).

GUIDO, gwē′dȯ (?–894), Duke of Spoleto. He contested the Italian crown with Berengar I (q.v.), with the result that he was crowned King at Pavia (889). In 891 the Pope placed the Imperial crown on his head. See Spoleto.

GUIDO D'AREZZO, dä-rĕt′sȯ, or **GUIDO ARETINO** (c.995–c.1050). A famous reformer of music and a monk of the Benedictine Order. It had been generally believed that he was born at Arezzo, until Dom Germain Morin discovered evidence that he had been educated in the monastery of St. Maur des Fossés, near Paris; so that it seems probable that he was born near Paris. He has the reputation of being the inventor of musical notation and has been styled "The Regenerator of Music." But the circumstances which led to this invention are differently stated by nearly every narrator. The most plausible and possibly the most reliable account is that on one occasion, while chanting with the monastery choir a hymn in honor of St. John, he was struck with the gradual and regularly ascending tones of the opening syllable sounds of each hemistich in the first three verses:

"*Ut* queant laxis *Re*-sonare fibris
Mi-ra gestorum *Fa*-muli tuorum
Sol-ve polluti *La*-bii reatum," etc.

Comprehending the fitness of these sounds to his proposed system of solfeggio, he promptly systematized the idea. The fame of Guido's musical invention, and the success he achieved with it, particularly among the youthful choristers of his own monastery, while gaining for him considerable ill will and subjecting him to much jealousy in his own and neighboring monasteries, finally brought him to the attention of the Pope (John XIX), who invited him to Rome. Guido immediately accepted the invitation and met with a very gratifying reception. The Pope became a student of the new system and did much to help the cause. In 1029 Guido became prior of the monastery of Avellano, where he probably died.

Research and tradition are united in ascribing to him the introduction of the four-line staff, which was a combination of the former red *f* line and yellow *c* line, with the addition of a black *a* line between them, and a black *e* line above them; the mensural notes being written on the lines and spaces. Extra lines were added either above or below, whenever necessary. By this invention a uniformity of pitch was obtained, which in itself marks one of the most important steps in the history of music. He left many interesting writings explanatory of his musical doctrines, among which may be mentioned the *Microlologus* and the *Argumentum Novi Cantus Inveniendi*. See Musical Notation; Guidonian Hand.

GUIDO DELLE COLONNE, dĕl′lȧ kȯ-lŏn′nȧ. An Italian poet of the thirteenth century, probably a Sicilian by birth. For a long time he was a judge at Messina. He wrote Italian poems patterned after Provençal models, and in Latin a *Historia Trojana*, based on Dictys and Dares and on the *Roman de Troie* of Benoit de Sainte-Maure. The *Historia* was very popular in the Middle Ages and, translated into nearly all the tongues of western Europe, had a great effect on the literature of Italy, France, and England. Chaucer obtained from it the plot of *Troilus and Cressida*. Caxton's English version of the French translation by Raoul de Fevre was the first printed English book. Consult the announced edition of poems edited by Ernest Langley, and Hamilton, *Chaucer's Indebtedness to Guido delle Colonne* (New York, 1903).

GUIDO GUINICELLI, gwē′nē̇-chĕl′lė. An Italian poet. See Guinicelli, Guido.

GUIDON, gī′don (older form *guydon*, from Fr. *guidon*, from *guider*, to guide). A color or pennon carried by troops of cavalry, batteries of field artillery, mounted sections of engineers, and mounted companies of the signal corps. The guidon for cavalry, field artillery, and signal corps is cut swallow-tailed; for engineers is triangular shape. Colors: cavalry, red and white; field artillery, scarlet; signal corps, orange; engineers, scarlet. (Consult *United States Army Regulations*, Washington, 1913.) It aids in maintaining alignments, being placed on the flank on which the guide is indicated. In column formations it is placed at the head of the columns. See Colors, Military.

GUIDON DE LA MER, gē̇′dôɴ′ d*e* lȧ mâr (Fr., banner of the sea). A French treatise on maritime law, which appeared at Rouen between 1556 and 1584. Notwithstanding the fact that it was of unknown authorship, it rapidly gained a position of great authority, comparable to that of the *Consolato del Mare* (q.v.), and the *Ordonnance de la Marine* (q.v.), promulgated by Louis XIV of France in 1681. The first known edition is dated 1607. See also Maritime Law; Oléron, Laws of; Rhodes, Law of; Wisby, Laws of. Consult also Cleirac, *Us et coutoumes de la mer* (Bordeaux, 1661), and Kaltenborn, *Grundsatze des practischen europaischen Seerechts* (Berlin, 1851). The best edition is that contained in Pardessus, *Collection de lois maritimes antérieures au XVIIIe siècle* (Paris, 1828–45).

GUIDONIAN (gwē̇-dō′nĭ-*a*n) **HAND.** A mechanical device for teaching the syllables of solmization (q.v.). Guido of Arezzo distributed the 20 tones of his scale over the finger tips and joints of the left hand. But as the hand has only 19 tips and joints, the twentieth tone (which was very seldom used) was assigned to a point above the tip of the middle finger. After the position of the different tones on the hand was once committed to memory, the pupil was enabled to tell any interval or scale by merely glancing at his left hand.

GUIDO (gwē′dȯ) **OF LUSIGNAN,** lụ′zē̇′-nyäɴ′. See Guy of Lusignan.

GUIDO OF SIENA. A painter of the thirteenth century, about whose work there is much controversy. He is important mainly as an immediate predecessor of Cimabue and Giotto and seems to have been slightly superior to his contemporaries, such as Margaritone and the Berlinghieri, and the equal of Giunta Pisano. This assumption is based upon a large painting of the Virgin and Child enthroned, with six angels, formerly in San Domenico, now in Palazzo Pubblico, Siena. It is signed "Guido de Senis" and dated "1221." Sienese writers therefore claim for him, rather than for Cimabue, the honor of first reviving painting in Italy. But on account of existing spaces between the numerals, Milanesi, and following him Crowe and Cavalcaselle, read "1281," and identify the painter with Guido Graziani, a Sienese of the later fourteenth century. It seems more likely, however, that, as Douglas maintains, the entire panel has been repainted, so that no conclusions from its style are warranted. But the inscription seems unchanged; for such spaces between numerals of 10 occur, and there is no reason for assuming that the date 1221 has been tampered with and changed to 1281. The whole question must therefore be regarded as unsettled. Consult Milanesi, *Della vera età di Guido* (Siena, 1859), and Crowe and Cavalcaselle, *History of Painting in Italy*, vol. i, edited by Douglas (London, 1893).

GUIDO RENI, rā'nē. An Italian painter of the Bolognese school. See Reni, Guido.

GUIENNE, gē'ĕn'. An ancient province of France. It comprised the territory now included in the departments of Gironde, Lot, Lot-et-Garonne, Dordogne, Aveyron, and the most important part of Tarnet-Garonne and Landes, and formed with Gascony what was originally Aquitania, of which name Guienne is a corruption. It became separated in 1259 from Gascony. For its earlier history, see Aquitania.

GUIEYSSE, gē'ās', Pierre Paul (1841–1914). A French mathematician, Egyptologist, and public official, born at Lorient. After studying in the college of his native town he entered in 1860 the Ecole Polytechnique. In 1863 he became a member of the marine hydrographical engineering corps, and during the siege of Paris in 1870 he was awarded the cross of a Chevalier of the Legion of Honor. From 1874 to 1893 Guieysse was an instructor in mechanics at the Ecole Polytechnique, and from 1877 to 1890 he was also actuary of a life-insurance company. In addition he was greatly interested in the language and civilization of ancient Egypt, lecturing on that subject at the Ecole des Hautes Etudes, supplying the chair of Egyptology at the Collège de France in 1886–87, and writing several valuable memoirs, which include: *Le rituel funéraire égyptien* (1876); *Le papyrus funéraire de Soutimès* (1878); *Les inscriptions historiques du grand temple d'Ipsamboul.* He also took an active part in the political life of the nation, as deputy (1890–1910), as Minister of the Colonies (1895–96), and as a member of the Superior Council of the colonies (1903–06), representing New Caledonia.

GUIGNES, gē'ny', Joseph de (1721–1800). A noted French Orientalist and Chinese scholar. He was born at Pontoise in the Department of Seine-et-Oise. In 1752 he was elected to the Royal Society of London and in 1754 to the French Academy of Inscriptions. He became professor of Syriac at the Collège de France in 1857. His great work, *L'Histoire générale des Huns, Turcs, Mongols, et autres Tartares occidentaux avant et depuis J. C. jusqu'à présent* (1756–58), is a rare specimen of industry and research.—His son, Chrétien Louis Joseph (1759–1845), also a very distinguished Oriental scholar, was Consul at Canton and published a Chinese dictionary (1813).

GUIGNIAUT, gē'nyō', Joseph Daniel (1794–1876). A French Hellenist and archæologist, born at Paray-le-Monial. He was appointed director of the normal school in 1830, afterward was made professor of Greek, and then professor of geography in the faculty (1835). In 1860 he was made perpetual secretary of the Academy of Inscriptions. His principal work, *Religions d'antiquité considerées principalement dans leur formes symboliques et mythologiques* (1825–51), is founded upon the *Symbolik* of G. F. Creuzer (q.v.). Other works include: *Dissertation sur la Vénus de Paphos* (1827); *Dissertation sur le dieu Serapis et son origine* (1838); *Théogonie d'Hésiode* (1835). He also contributed articles on archæology to the *Globe*, the *Revue Archéologique*, and other publications.

GUIGNOL, gē'nyōl'. A French puppet show, the equivalent of the English Punch and Judy. It was developed from the Italian *pupazzi* by Laurent Mourgnet, who in 1795 established a theatre for the Guignol in Lyons, which was kept up for many years by his descendants. The drama is said to be derived from Guignol, or Chignol, a silk weaver of Lyons, where, as also in Paris, the performance is one of the most popular street shows. See Punch.

GUIJA, gē'hȧ. A lake of Central America, situated in the republics of Salvador and Guatemala, at an altitude of over 3000 feet (Map: Central America, C 3). It is about 15 miles long and about 6 miles wide and is surrounded by mountains. It contains two volcanic islets.

GUIKOWAR, gī'ko-wär. See Gaikwar.

GUILBERT, gēl'bâr', Yvette (1869–). A Parisian singer, noted for her performances at cafés-concerts, like the Eldorado and the Ambassadeurs, and such theatres as the Nouveautés and the Variétés. She visited the United States in the season of 1895–96 and again in 1896–97 and also appeared with some success in Germany and England. In 1897 she became Madame Schiller. In 1902 she published two novels, *La vedette* and *Les demi-vieilles.*

GUILD, gĭld (AS. *gegild*, *gildseipe*, Icel. *gildi*, Ger. *Gilde*, guild, from AS. *gild*, Icel. *gjald*, payment, OHG. *geld*, Ger. *Geld*, money, from AS. *gildan*, Icel. *gjalda*, OHG. *geltan*, Ger. *gelten*, to pay, Eng. *yield*). A mediæval association whose members were pledged to assist each other in the pursuit of common ends. They have been classified as (1) ecclesiastical, (2) social-religious, and (3) trade guilds. The trade guilds may be subdivided into the guild merchant and the craft guilds. The aim of the ecclesiastical guilds was to promote piety and encourage good works; while the aim of the social-religious guilds was to perform certain social and religious functions, such as the holding of feasts, psalm singing, and escorting the dead to the grave. These guilds also endeavored to secure protection for members from personal injury. The trade guilds were mainly designed to protect the economic interests of their members, but social and religious functions were also performed by them.

Origin of Guilds. The origin of the guilds is still a matter of dispute. They first became prominent after the ninth century, when the original tribal organization of the Teutonic races had broken down and in some cases succeeded to the functions of the tribe. The spread of Christianity had a great influence upon their development. It is possible that on the Continent the trade corporations of the Roman Empire had not wholly disappeared and formed the nucleus of some of the later guilds.

Guilds are first mentioned in the Carolingian capitularies of 779 A.D. The first authentic notice of guilds in England dates from the ninth century. These early guilds were social-religious in their nature. In England evidence of trade guilds does not appear before the Norman Conquest, when the great increase in trade made associations for mutual protection necessary. They had probably appeared somewhat earlier in Flanders and North France.

Social-Religious and Ecclesiastical Guilds. The history and organization of the social-religious guilds are involved in much obscurity. They were presumably local organizations. In some cases they became powerful and were vested with manorial jurisdiction. In England they lost their importance after the Norman Conquest. The ecclesiastical or religious guilds, on the other hand, grew in wealth and power down to the beginning of modern times. In London there were a large number of them. In the reign of Richard II a guild in honor of St. George the Martyr, consisting of an alderman, master, brothers, and sisters, was established in Norwich. King Henry V confirmed it by letters patent under the great seal, made it perpetual, and granted it certain privileges and immunities (Madox, *Firma Burgi*). In like manner guilds were formed in Bristol, Exeter, and other large towns. These guilds, through the munificence of individuals, by degrees amassed considerable wealth. By Henry VIII the property and revenues of these religious guilds were seized and perpetually vested in the crown. See BROTHERHOODS, RELIGIOUS.

The Guild Merchant. In its early stages the guild merchant was doubtless a private institution, designed solely to protect the interests of its members. By the twelfth century it had become in England and in some continental cities a semipublic body, possessing by charter a monopoly of all trade carried on within the town. Those who were not of the guild might, indeed, sell their wares, but not at retail. They were, moreover, subjected to all sorts of petty exactions from which guild members were exempt. Entrance to the guild merchant was free to all burgesses who would share in the "scot and lot"—the general burden of taxation. Citizens of distant towns might be given the privileges of the guild. (See LAW MERCHANT.) This was, however, less generally the case on the Continent. In continental countries the guild merchant never attained the influence that it attained in England. In many cities it remained practically a private institution parallel with the craft guilds.

The Craft Guilds. With the growth of industry the members of different trades began to associate themselves for the defense of their own special interests. These associations were known as the craft guilds in England, as the *corporations de métiers* in France, and the *Zünfte*, or *Innungen*, in Germany. In England we may regard them as the outgrowth of the guild merchant. Supervision in the various trades, regulations as to membership, and like functions were consigned to these guilds. Members might still belong to the guild merchant. As one craft after another was organized, the guild merchant lost its functions as a regulator of trade and finally lost its individuality, becoming an integral part of the municipal constitution.

In their inception the craft guilds admitted to their ranks all who could exercise their trades with sufficient skill. They sought to insure good workmanship and therefore required that each craftsman should have served an apprenticeship. Officials of the guild supervised the entire process of production, to see that no deception was practiced. Night work was for this reason forbidden. In so far, therefore, the interests of the consumer were protected. They sought to protect their own interests by preventing all competition, both from without and within. Nonmembers were not permitted to practice the trade within the towns; and the members were required to sell at the same rates and to pay equal prices for raw materials. During the flourishing period of their existence (from the twelfth to the fifteenth century) the craft guilds did much to advance the standard of workmanship and to procure a satisfactory existence for their members.

The membership of the guilds consisted in master workmen, journeymen, and apprentices. The master workman alone bought materials and sold the finished product; the journeymen lived in the master's household and received a fixed wage for their work. The apprentices also lived with the master, but as a rule they received for their labor nothing but their board and training. In the period of greatest prosperity each apprentice looked forward to becoming a journeyman, and each journeyman could become a master. In France and Germany, and less generally in England, it was the custom in some trades for each craftsman who had completed his apprenticeship to travel from place to place, learning new methods of work. It was also customary to require from the journeyman who wished to become a master the performance of a piece of work as evidence of his capacity—a chef d'œuvre or masterpiece. These customs obviously exerted a very beneficial influence upon mediæval industry.

Prominent examples of the trade guild in England were the weavers' and goldsmiths' guilds. The weavers' guild was the earliest and most important of the craft guilds. Weaving was the first important industry to break away from the house system, hence the early development of the guild. In 1130 we find mention of an influential weavers' guild in London, Lincoln, and Oxford. At the height of its powers the guild claimed full jurisdiction over its members in pleas of debt, contract, and petty agreements. It held a monopoly of the cloth industry and regulated the quality and prices of the goods produced. Later it split into several branches, of which one, the drapers, became an association of great importance, developing into the merchant class which later won for England her commercial supremacy. In the fifteenth century the influence of the weavers' guild was broken by the introduction of the domestic system of industry in the cloth trade, under which the craftsman, originally an independent worker owning his own tools and purchasing his own materials, became a mere wage earner. The guild continued to exist until the eighteenth century, but without vitality or influence.

The earliest mention of a goldsmiths' guild dates from 1180. At that time the guild was "adulterine," i.e., unauthorized by the crown. Later, however, the goldsmiths constituted one of the more powerful guilds of London and are regularly mentioned near the head of the list of the "twelve great companies." By a statute of 1300 the guild received the office of establishing a standard of fineness for gold and silver used in the arts. The standard was established in London, and officers of the guild were to visit other cities, establishing in each place the London standard. Throughout the Middle Ages the goldsmiths' guild seems to have played an important part in determining the standards adopted in the coinage. At the beginning of modern times we find the goldsmiths a wealthy and powerful body, who undertook, in addition to the work of their craft, the functions of deposit and lending of money.

In England the craft guilds did not generally aim at political power. On the Continent, on the other hand, prolonged struggles were carried on between the guilds and the aristocracy. In some parts of Germany the contest for political power culminated in civil war. During a part of the thirteenth and fourteenth centuries the guilds succeeded in securing political supremacy in some of the cities of Germany.

Journeyman Guilds, Compagnonnage. The movement of population to the towns, which characterized the later Middle Ages, created in the guilds a tendency towards exclusiveness. The period of apprenticeship was lengthened for those who were not the children of guild members, and certain classes were excluded from membership altogether. The period of journeying from place to place was also lengthened, and the fees for admission to the guilds were increased. The "masterpiece" became a very onerous and costly piece of work, sometimes requiring several months of labor and heavy expenditures for materials. The chance of the journeyman's becoming a master workman was accordingly greatly reduced. A cleft appeared between the interests of the master and those of the journeymen. The latter associated themselves in the so-called journeyman or yeoman guilds of England and the *compagnonnage* of France. These organizations sought to secure better wages from the masters and to assist members in distress. The *compagnonnage* in particular developed into a powerful organization. Its members were bound by oaths to carry out the policies of the organization. The masters naturally opposed it in every way, as did also the clergy and the state. It continued, however, to thrive. In 1791 it was formally proscribed by the Revolutionary government, but it was beyond the reach of the police power. During the nineteenth century, however, its significance dwindled away. Only vestiges of it remain at present.

Decline of the Guilds. The guilds were strictly local institutions, working for a local market, and their monopoly was a local monopoly. The commercial progress which followed the era of discovery reacted upon the industrial organization. It offered a wider market than had heretofore been known and encouraged production upon a large scale, to which the guild system was inherently antagonistic. It was necessary that either the guilds should abandon their policy of exclusiveness and restriction, or that industry should be transferred to new centres, where guild regulations had no force. In England these things occurred. In some of the older towns great inroads were made in the industrial privileges of the organized masters. Where custom and tradition stubbornly resisted such innovations, towns gradually sank in importance. On the other hand, in the north of England, even before the utilization of coal in modern production, new towns and industrial centres arose where the guilds had no sway. On the Continent of Europe the system lost its vigor in the latter half of the eighteenth and first half of the nineteenth century, owing to the general development of modern industry.

Guilds, Musical. With the decline of the troubadours and the passing of music from the aristocratic minnesingers to the civic meistersingers, a corresponding change took place in the attitude of the general public towards musicians. Instead of being fêted and praised they were now looked upon as mere hirelings, whose morals were doubtful, and who deserved little consideration and no civil privileges. In self-defense, therefore, the minstrels, jongleurs, and itinerant musicians banded themselves together into guilds. These organizations, which differed little from the commercial guilds, were recognized by the King or by the local authorities, and the members admitted to certain privileges within the territory governed by their guild. Authority was vested in a king or warden, and a board of control, who arbitrated any disputes between the members. The first musical guild of which we have record was the Nikolaibrüderschaft, which was organized in 1288. Soon after the musicians of Strassburg founded the Bruderschaft der Kronen, and about the same time the famous confréries de Saint Julien des Ménétriers came into prominence in Paris. This latter guild acquired wide influence, even requiring all music teachers and organists to belong to it, and was abolished only in 1773. In England the Musician's Company of the City of London was formed in 1472, and incorporated by James I in 1604 as the Worshipful Company of Musicians. This guild was given exclusive rights. "All musicians and dancing masters playing for hire in the city of London are obliged to take up their freedom thereof in the Company of Musicians only." As every musician had to pay £1 12s. to the company for the freedom of the city, and as binding an apprentice cost £1 10s. 2d., it will be seen how the Worshipful Company quickly acquired considerable power. Every member was further obliged to take an oath swearing loyalty to the King and city, and promising to be "obedient unto the Master and Wardens of the Art or Science of Musicians of London, for the time being, in all things concerning the same Art and Science." Instrument makers fared badly in the Middle Ages. For the most part they were compelled to join nearly allied guilds, but in France and Belgium a number of separate instrument makers' societies were formed. Consult: Gross, *Gild Merchant* (Oxford, 1890); Seligman, *Mediæval Guilds* (Baltimore, 1887); Saint-Martin, *Histoire des corporations de métiers* (2d ed., Paris, 1909); *Le compagnonnage* (ib., 1901); S. Kramer, *English Craft Gilds and the Government* (New York, 1905); A. Franklin, *Dictionnaire historique des arts, métiers et professions de Paris depuis le treisième siècle* (Paris, 1905); E. Staley, *Guilds of Florence* (London, 1906); G. Unwin, *The Gilds and Companies of London* (New York, 1909); H. B. Morse, *Guilds of China* (ib., 1909); Müller, *Zur Frage des Ursprungs der mittelalterlichen Zünfte* (Leipzig, 1910); A. Stöckle, *Spätromische und byzantinische Zunfte* (ib., 1911); C. Brauns, *Kurhessische Gewerbepolitik im 17. und 18. Jahrhundert* (ib., 1911); Thornley and Hastings, *Guilds of the City of London and their Liverymen* (London, 1911). See HANSEATIC LEAGUE.

GUILD, gild, CURTIS (1827–1911). An American journalist, born in Boston. He began a mercantile career, but in 1847 took up reporting for the Boston *Daily Journal.* Two years later he joined the staff of the *Traveler,* of which he became part owner in 1856. In 1859 he founded and became editor of the Boston *Daily Commercial Bulletin,* and he remained its editor until 1898. Among his publications are the following: *Over the Ocean* (1867); *Abroad Again* (1877); *Britons and Muscovites* (1888); *A Chat about Celebrities* (1896); *From Sunrise to Sunset,* a volume of poems.

GUILD, Curtis, Jr. (1860–1915). An American journalist, politician, and soldier, son of the above. He was born in Boston, Mass., graduated at Harvard in 1881 with highest honors, and took a position on the Boston *Commercial Bulletin,* his father's paper. Of this paper he became editor and proprietor in 1902. He entered Republican State politics in 1895, but at the outbreak of the Spanish American War, as brigadier general of the State troops, he was called to the front and became inspector general of the Department of Havana. At the close of the war he declined the posts of First Assistant Postmaster General, and chairman of the National Civil Service Commission. He accompanied Theodore Roosevelt, the vice-presidential candidate, in his tour of the West during the 1900 campaign and was Lieutenant Governor of Massachusetts in 1902–05, and Governor in 1906–09. He was selected Special Ambassador to the Mexican Centennial by President Taft in 1910, and after his return was Ambassador to Russia until his resignation in 1913.

GUILD, Reuben Albridge (1822–99). An American author and librarian. He was born in West Dearborn, Mass., and was educated at Brown University, where, after graduating in 1847, he was appointed librarian, a position which he held until 1893. His publications include: *The Librarian's Manual: A Treatise on Bibliography* (1858); *History of Brown University* (1867); *Biographical Introduction to the Writings of Roger Williams* (1866); *Chaplain Smith and the Baptists* (1885). He edited Staples's *Rhode Island in the Continental Congress, 1765–90* (1870); *Literary and Theological Addresses of Alva Woods* (1868); *Letter of John Cotton, and Roger Williams's Reply* (1866).

GUILDER. See Florin.

GUILDFORD, gĭl′fẽrd. The county town of Surrey, England, situated on the river Wey, 30 miles southwest of London (Map: England, F 5). Grain, celebrated as Surrey wheat, is its staple commodity; fairs are held for horses, cattle, pigs, and sheep; it has breweries, iron foundries, brick fields, paper and powder mills, and is an important railway centre. The town consists mainly of one long wide street with many well-built and many old and picturesque houses. The prominent buildings are the Norman keep of the ruined castle which stands in a public park; the Archbishop Abbot's hospital (1619), Trinity and St. Mary's churches, the guildhall, corn market, county hospital, institute, and royal free grammar school founded in 1509 by Edward VI, containing a chained library, while 6 miles distant at Cranleigh is a large and important public school. Guildford is a suffragan bishopric to Winchester. The town owns its markets and water supply. Guildford was bequeathed in the will of Alfred the Great to his nephew Ethelwald and was a royal demesne and occasional regal residence until 1630. Pop., 1901, 16,000; 1911, 22,820.

GUILDHALL, gĭld′ha̤ll. The council hall of the city of London, which may be regarded as the town hall, and is the place of assembly of several courts, as the court of common council, the court of aldermen, the chamberlain's court, and a police court presided over by one of the aldermen. The construction of the building was begun in 1411. It was partially destroyed in the great fire of 1666, but was soon restored, and in 1789 it was altered to its present form. The hall proper is 153 feet in length, 48 in breadth, and 55 in height. It has been famous for centuries for the magnificence of its civic feasts. The first time it was used for this purpose was in 1500, when Sir John Shaw, goldsmith, who had been knighted on the field of Bosworth, first gave here the Lord Mayor's feast.

GUILFORD, gĭl′fẽrd. A borough in a town of the same name, New Haven Co., Conn., on Long Island Sound, 17 miles east of New Haven, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, E 4). It has a public library and an old stone house, built in 1639, which now serves as a State museum. The borough is engaged in agriculture, is the seat of a considerable canning industry, and has manufactures of iron, wheels, and school furniture. Pop., 1900, 1512, and of the town, 2785; 1910, 3001.

Settled as Menunkatuck, in 1639, by a company from England under the Rev. Henry Whitfield, Guilford received its present name and became part of the New Haven Colony in 1643. The borough was incorporated in 1815, and in 1826 the town was divided, Madison being set off as a separate township. There is a tradition, apparently well authenticated, that the regicides Goffe and Whalley came to Guilford in 1660 to surrender to William Lete, a native of Guilford, then Governor of the New Haven Colony, and that they were carefully secreted for several days and nights in the Governor's cellar. Guilford was the birthplace and the home for many years of the poet Fitz-Greene Halleck. Consult R. D. Smith, *History of Guilford* (Albany, 1877), and an article in the *New England Magazine,* new series, vol. i (Boston, 1884).

GUILFORD, Earl of. See North, Frederick, Lord.

GUILFORD COLLEGE. A village in Guilford Co., N. C., 7 miles west of Greensboro, on the Southern Railway (Map: North Carolina, C 1). It is the seat of Guilford College (Friends), established in 1837, and contains a Carnegie library. It is surrounded by a farming and dairying region. The electric-light plant is owned by the college. Pop., about 300.

GUILFORD COURT HOUSE. Formerly a small village in Guilford Co., N. C., 5 miles northwest of Greensboro. A battle lasting five hours was fought here, March 15, 1781, between 4404 Americans under Greene and 2213 English under Cornwallis, the former losing 400 and the latter 600 in dead, wounded, and prisoners. Though neither side gained a decisive advantage, the battle has been regarded as a great strategic victory for Greene, as it closed a campaign in which Cornwallis was outgeneraled and forced to abandon the Carolinas. The site of the battle has been converted into a park, highly improved, and a number of monuments have been placed here, notably one to General Greene, for which Congress appropriated $25,000.

GUILLAUME, gē̇′yō̇m′, (Jean Baptiste Claude) Eugène (1822–1905). A French sculptor. He was born at Montbard (Côte-d'Or) and studied at the Ecole des Beaux-Arts under Pradier, and won the Prix de Rome in 1845. At Rome he formed an austere style, in great contrast to that of his master, and modeled his "Mower," followed (1852) by the marble "Anacreon," and in 1853 by "The Gracchi," two half-length figures in bronze, which established his reputation (all of these are in the Luxembourg Museum, Paris). Other works in the same style are the "Roman Marriage" (1877), two statues of Napoleon as lieutenant of artillery and as Emperor, and the monument of the architect Duban. Guillaume modeled busts of Ingres (Musée Bonnat, Paris), Balbard, Buloz, Sequin, Jules Ferry, President Grévy, Monsignor Darboy (Luxembourg), and others, including six busts of Napoleon. His ideal figures are less fortunate; the best known being the group of "Music" on the façade of the new Opera House. In his personality and in his work Guillaume was scholarly, dignified, and severe. His art at its best unites austere realism with high finish. He received medals of honor at the expositions of 1867 and 1878, was a member of the Institute, and was professor at the Ecole des Beaux-Arts from 1865 to 1875 and also a director of that institution. He was also a prominent lecturer and writer on the fine arts and published *Notices et discours* (1895). Consult Gonse, *La sculpture française* (Paris, 1895).

GUILLAUME DE CHAMPEAUX, de shäɴ'pō̇' (c.1070–1121). A French scholastic, born at Champeaux. He was a pupil of Anselme de Laon in Paris, afterward opened a school himself in connection with the cathedral of Notre Dame, and thus became the first really great teacher to give prominence to Paris as a centre of learning. Here one of his scholars was his great rival, Abélard. Jealous, it is said, of the younger man's brilliancy, Champeaux removed to a suburb of Paris, where he founded the abbey of St. Victor (1113). At this time he was made Bishop of Châlons-sur-Marne. In the controversy regarding investiture he took the part of Calixtus II and was his representative at the Conference of Mousson. He stood for realism as against the nominalism of Abélard, but in a less positive and more scientific form than that of his old master, Anselme. Only three of his treatises have been printed, and these among the works of St. Bernard. He has been called "the first dialectician" of the Realist sect. Consult: Haureau, *De la philosophie scholastique* (Paris, 1850); Michaud, *Guillaume de Champeaux et les écoles de Paris au XIIème siècle* (ib., 1867); G. Lefèvre, *Les variations de Guillaume de Champeaux et la question des universaux* (ib., 1899).

GUILLAUME DE LORRIS, lō̇'rē̇s' (c.1215–c.1240). A French mediæval poet, born at Lorris. Of the man himself nothing is known, except that he was the author of the *Roman de la Rose* (q.v.). Four thousand of the 22,000 lines in the poem are his, and the sudden break is presumed to have been caused by his early death. The *Roman* was completed by Jean de Meun about 1277, but in a very different style. Guillaume's part in it has been called "a complete mediæval art of love." For further information, consult E. Langlois, *Origines et sources du Roman de la Rose* (Paris, 1891).

GUILLAUME DE MACHAULT, or **MACHAUT,** mȧ'shō̇' (c.1290–1377). A French poet and musician, born near Machault in Champagne. He was secretary to John of Luxemburg, King of Bohemia. In this capacity he accompanied the King in his various expeditions and remained with him until his death, at the battle of Crécy (1346). When John the Good ascended the throne of France, he gave Guillaume the office of Royal Notary (1350). Meanwhile he had held different ecclesiastical positions. His musical compositions consist of motets, ballads, and rondeaux for several voices, and a mass, which was sung at the coronation of Charles V (1364). The manuscript of this is in the National Library, Paris. He was a precursor of the famous Rhétoriqueurs. Of his numerous poems, one describes the instruments of music used in those days. Among the others are: *Le comfort d'ami* (1356); *La prise d'Alexandrie,* the history of Pierre I of Lusignan, King of Cyprus; and *Le livre du voir-dit,* his best-known work. Consult Tarbé, *Les œuvres de Guillaume de Machaut* (Paris, 1849), and Paulin Paris, *Le livre du voir-dit de Guillaume de Machaut* (ib., 1875).

GUILLAUME DE PALERME, de pȧ'lârm'. An old French romance, of which the translation has been printed by the Early English Text Society under the title of *William of Palerne.* It is founded on the werewolf superstition. Consult: Saintsbury, *A Short History of French Literature* (New York, 1882); Léon Gautier, *La chevalerie* (Paris, 1884); K. W. Tibbals, "Elements of Magic in the Romance of William of Palermo," in *Modern Philology,* vol. i (Chicago, 1903); N. Zingarelli, *Il Guillaume di Palerme* (Palermo, 1907); A. L. Spence, *Dictionary of Mediæval Romance* (London, 1913).

GUILLAUMET, gē̇'yō̇'mä̇', GUSTAVE ACHILLE (1840–87). A French landscape and genre painter, born in Paris. He studied at the Ecole des Beaux-Arts under Picot and Barrias, and won the Prix de Rome in 1863. Soon afterward he went to Biskra (Algeria) and began the series of Algerian scenes by which he became known. The first of these, "Evening Prayer in the Desert" (1863), is in the Luxembourg. The somewhat melancholy and mysterious character of the Orient as he paints it in its infinite repose is in striking contrast to the brilliant, sparkling treatment by Fromentin of the same subjects. His other works include: "Laghouat," "The Seguia Ravine, near Biskra," both in the Luxembourg; "Arab Market in the Plain of Tokria"; "The Famine"; "The Dogs of Douar." He also contributed to the *Nouvelle Revue* articles afterward collected and published with the title *Tableaux algériens* (1880), an interesting literary comment on his own work.

GUILLAUME TELL (Fr., William Tell). An opera by Rossini (q.v.), first produced in Paris, Aug. 3, 1829; in the United States, Dec. 3, 1842 (New Orleans). See the article TELL, WILLIAM.

GUILLEMEAU, gē̇l'mō̇', JACQUES (1550–1613). A French surgeon, born at Orléans. He studied medicine at the Hôtel Dieu in Paris, served for several years in the army, and in 1595 became provost of the College of Surgeons, Paris. He was the author of several treatises of considerable value and authority, such as: *Traité des maladies de l'œil* (1585); *De la grossesse et de l'accouchement des femmes* (1621); *Œuvres de chirurgie* (1602); *La chirurgie française* (1594).

GUILLEMIN, gē̇l'măɴ', AMÉDÉE VICTOR (1826–93). A French scientific writer, born at

Pierre, Saône-et-Loire. He was educated in Paris and became a teacher of mathematics. He is best known as the author of many popular books on scientific subjects, such as: *Les mondes, causeries astronomiques* (1861); *Simple explication des chemins de fer* (1862); *Le ciel* (1864; 5th ed., 1877); *La lune* (1865); *Éléments de cosmographie* (1866; 3d ed., 1891); *Les phénomènes de la physique* (1867); *Les applications de la physique aux sciences* (1873); *La vapeur* (1873); *Les comètes* (1874); *La lumière et les couleurs* (1875); *Le son* (1876); *Les étoiles* (1877); *Les nébuleuses* (1880); *Le monde physique* (5 vols., 1880–85); *Petite encyclopédie populaire* (12 vols., 1886–91).

GUILLEMIN, Jacques Antoine (1796–1842). A French botanist, born at Pouilly-sur-Saône, Côte-d'Or. He was educated at Dijon and Geneva and went afterward to Paris, where he was at first a private tutor, then assistant in the museum, then professor of botany at the horticultural institute (1830–34). Four years afterward he was sent to investigate the tea plantations of Brazil to determine if the plant could not be grown in France and returned with a large number of specimens, though the greater part of them were spoiled in transit. He contributed articles to the botanical archives and to various learned societies, made also an official report of his trip to Rio de Janeiro, and published besides: *Recherches sur le pollen* (1825); *Icones Lithographicæ Plantarum Australiæ Rariorum Decades Duæ* (1832); *Considérations sur l'amertume des végétaux* (1832).

GUILLEMOT, gĭl′ê-mot (Fr. *guillemot,* from Bret. *gwelan,* Welsh *gwylan,* Corn. *gullan,* gull + OF. *moette,* Fr. *mouette,* dialectic Fr. *mauwe,* from OHG. *meh,* Icel. *mar,* Dutch *meeuw,* Ger. *Mowe,* AS. *maew,* Eng. *mew*). Any auk (q.v.) of the genera *Cepphus* and *Uria;* specifically, the common or "foolish" guillemot, or murre (*Uria troile*). These auks are extremely abundant in the Arctic regions and the colder parts of the temperate zone, particularly in the neighborhood of rocky coasts, the winter migrations extending as far south as the Mediterranean. It is called foolish guillemot from its often suffering itself to be taken by the hand rather than leave the cliffs on which it breeds, where numbers may be seen stationed close together on the ledges of rock. It lays only one egg, which has an exceedingly thick shell, is pear-shaped, and remarkably large, being more than 3 inches long. This egg exhibits remarkable variety in coloring. No nest is made, but the brooding bird places its webbed toes beneath the egg when incubating and warms it beneath and between its thighs. The skin, with the feathers, is used for clothing in some northern regions. Young birds and eggs are among the objects in pursuit of which the rock fowlers of the northern coasts scale or descend terrifying precipices. Great numbers of the eggs are exported from the coasts of Newfoundland and Labrador. In the north Pacific the common guillemot is replaced by a subspecies of *Uria troile californica.* The thick-billed guillemot, or "arrie" (*Uria lomvia*), has the same distribution in the New World as the common guillemot, and the Pacific coast form is called "arra." It is a somewhat larger bird than the other and has a bill much shorter and thicker. The black guillemot (*Cepphus grylle*) is a smaller species, about 14 inches long; the plumage is entirely black in summer, except a large white patch on each wing, but in winter the under parts are white. The young are mottled or spotted. It is plentiful throughout the Arctic regions and has been called "Greenland dove." It lays three eggs, often on the bare rock; but if the situation is damp it piles up for them a curious nest of pebbles. On the Pacific coast it is replaced by a similar species, the pigeon guillemot (*Cepphus columba*).

GUILLIM, gwĭl′ĭm, John (1565–1621). An English heraldic official, native of Herefordshire. He was educated at Oxford, but for the greater part of his life was red cross herald in ordinary at the London College of Arms. He was credited with the authorship of *The Display of Heraldrie* (1610; reprinted, 1724), but in reality simply edited Dean Barkham's collections.

GUILLOTIN, gē′yô′tăN′, Joseph Ignace (1738–1814). A French physician, born at Saintes. He was a brilliant student, and after obtaining his education in a Jesuit college he entered the order as a novitiate and for several years was a teacher in their college at Bordeaux. Afterward he removed to Paris, where he practiced medicine with such success as to win recognition as one of the foremost physicians of the day. He took a prominent part in the early revolutionary movement, and his suggestion that some kind of decapitating machine be used in inflicting the death penalty forever connected his name with the most terrible events of the French Revolution. He was secretary of the National Assembly in 1790, after which he retired and took no part in the Reign of Terror, during the latter part of which, indeed, he was himself a prisoner and in constant danger of being guillotined. After the rise of Napoleon he resumed his practice in Paris, where he was one of the earliest and most earnest champions of vaccination.

GUILLOTINE, gĭl′lô-tēn′. The instrument of decapitation introduced during the French Revolution by the Convention and named after its supposed inventor, Joseph Ignace Guillotin, a physician, who, however, was merely the person who first proposed the adoption of a decapitating machine. It is said he obtained the idea from the account of an execution at Milan in 1702, which is found in an anonymous work called *Voyage historique et politique de Suisse, d'Italie, et d'Allemagne.* The guillotine consists of two upright posts, grooved on the inside and connected at the top by a crossbeam. In these grooves a sharp iron blade, placed obliquely, descends by its own weight on the neck of the victim, who is bound to a board laid below. The invention of machines of this kind is ascribed to the Persians. In Italy, from the thirteenth century, it was the privilege of the nobles to be put to death by a machine of this kind, which was called *mannaia.* An instrument resembling the guillotine was likewise employed in Germany during the Middle Ages. During the sixteenth and till late in the seventeenth century a machine called the maiden, which differed but slightly from the guillotine, was employed in Scotland for the purpose of decapitation. That such an apparatus was known and used in France at an earlier period is proved by the execution of the Duc de Montmorency, who is described as having been executed by a falling axe at Toulouse in 1632. The Dutch, too, in the eighteenth century, employed a decapitating machine in executing slaves in their colonies. Consult Le Nôtre, *La guillotine pendant la révolution* (Paris, 1893).

GUILMANT, gēl′mäN′, Félix Alexandre

(1837–1911). A French organ virtuoso and composer. He was born at Boulogne and received his earliest instruction from his father, who was a professional musician. He later studied the organ with Lemmens and harmony with Carulli. From early boyhood he was distinguished for his love of music, and the persistent sincerity of his studies, which enabled him when but 12 years old to act as his father's substitute at the organ of the church of St. Nicholas. Four years later (1853) he was appointed organist at the church of St. Joseph. Other appointments were: 1857, choir master of St. Nicholas; 1871, La Trinité; 1893, Chevalier of the Legion of Honor; and 1896, professor of the organ at the Paris Conservatory. He died at Meudon, near Paris. He was the foremost exponent of the distinctively French school of organ music; and on that account, as well as for his brilliancy as an organist and wonderful powers of improvisation, met with great success in his tours of England, Italy, Russia, and the United States. His playing was marked by the striking orchestral qualities of his combinations, a feature which is similarly conspicuous in his compositions. His published works include the lyric scena for soli, chorus, and orchestra, *Belsazar;* a symphony for organ and orchestra; seven organ sonatas; and many smaller pieces for organ. His vocal compositions include motets, three masses, and *a cappella* choruses.

GUILT, GUILTY (AS. *gylt.*, *gilt*, from AS., Goth. *gildan*, OHG. *geltan*, Ger. *gelten*, Eng. *yield*). In law, guilt is the fact, whether an overt act or a state of mind combined with an overt act, which renders a person liable to punishment for a criminal offense. In most cases a criminal intent is requisite to constitute guilt on the part of the person committing an act which results in harm to the person or property of another, but in certain cases the commission of a forbidden act in itself constitutes legal guilt, and there are other acts, innocent in themselves, which become criminal only when performed with a guilty intent. (See CRIME; INTENT.) To make an intent criminal, or guilty, it is not necessary that the wrongdoer intended a violation of law nor that he should have a sense of guilt, but only that he intended to commit an act which the law condemns as criminal. In the common-law system a person accused of crime is presumed to be innocent until his guilt has been established by the verdict of a jury. What is meant by this is not that the jury is to hold the opinion, as a matter of fact, that a person presented by a grand jury for trial is probably innocent, but only that the burden rests upon the prosecution of establishing all the elements of conduct and intention which constitute the crime charged, and, further, of satisfying the jury beyond a reasonable doubt of the guilt of the accused. In England and America there are only two general verdicts which can be given in criminal cases, viz., "guilty" or "not guilty"; but in Scotland there is an intermediate verdict, called "not proven," which, though in legal effect a verdict of "not guilty" (and it is so entered in England), yet is allowed to be given by juries when the evidence fails to satisfy them either of the guilt or innocence of the accused. It has been objected to this verdict that it leaves a stigma on the presumably innocent party against whom it is found. The answer to this objection is that the verdict "not proven" is a safety valve which often operates to save from condemnation a person whom a jury believes to be guilty, but where it deems the legal evidence insufficient to establish that conclusion beyond a reasonable doubt.

A person charged with crime is said to have a "guilty mind" when he has sufficient mental capacity to understand the nature and quality of the criminal act in question. Even though he has such capacity, if the act were done under extreme duress (q.v.), the actor would not display a guilty mind. For the effect of the plea of "guilty" or "not guilty," in criminal actions, see GENERAL ISSUE; PLEA.

GUIMARÃES, gē′mȧ-rīɴsh′. A town in the Portuguese District of Braga, Province of Minho, situated in a valley surrounded by hills, 35 miles northeast of Oporto (Map: Portugal, A 2). It is a picturesque place, with its old Moorish fort, and the ruins of the former castle, in which Alfonso Henriques, the first King of Portugal, was born. Among other interesting buildings are the Dominican convent, the collegiate church of Santa Maria de Oliviera, which contains the font at which Alfonso was baptized, the church of São Miguel, dating from the eleventh century, and the town hall, a combination of Moorish and Gothic style. It manufactures preserved fruits, linen, leather, cutlery, textiles, ironware, and paper. In the vicinity of the town are situated hot sulphurous springs, known to the Romans as Aquæ Lævæ. Pop., 1900, 8863.

GUIMBAL, gēm-bäl′. A seaport town of Panay, Philippines, in the Province of Iloilo, situated 17 miles east of Iloilo. It makes rough textiles, and exports dyewood. Pop., about 7500.

GUINEA, gĭn′ē. A geographical term formerly designating the West African coast region between the Senegal River on the north and the Orange River on the south, and now being gradually restricted to Portuguese Guinea (adjoining Senegambia) and Angola (qq.v.) (Map: Africa, C 3). The region extending from Sierra Leone to the Gabun River in French Equatorial Africa was generally termed Upper Guinea, and the region south Lower Guinea. The term "Northern Guinea" was sometimes applied to the coast of what is now Nigeria and Kamerun. The four Guinea islands were Fernando Po, Annobon, Principe, and St. Thomas. The earliest form of the word began to appear on maps in the middle of the fourteenth century. The Portuguese were the first to explore and trade along the Guinea coast, tempted by the gold deposits, and later also by the opportunities of slave trading. The coast, besides having an almost deadly climate, is generally hard of access from the sea, owing to a rough surf and lack of good havens.

GUINEA. A gold coin formerly current in Great Britain, but now no longer coined. It derived its name from the fact that the gold from which the first specimens were coined was brought from the Guinea coast in West Africa. For the same reason it originally bore the impression of an elephant. It was first coined during the reign of Charles II in 1664 and continued in common use till 1817, when it was superseded by the sovereign (q.v.) Its value varied considerably at different periods, but was ultimately fixed at 21 shillings. It is still customary in Great Britain to estimate professional fees, honoraria of all kinds, complimentary subscriptions, prices of pictures, etc., in guineas.

GUINEA, GULF OF. That portion of the Atlantic Ocean which washes the west coast of Africa between Cape Palmas at the southeast point of Liberia and Cape Lopez in French Equatorial Africa about lat. 1° S. (Map: Africa, E 4). It forms two open bays, known as the Bight of Benin and that of Biafra.

GUINEA, PORTUGUESE. See PORTUGUESE GUINEA.

GUINEA CORN. A name sometimes given to durra, sometimes to another cereal grass, *Pennisetum typhoideum*, or *Pennisetum spicatum*, properly called pearl millet, which is very extensively cultivated in Central Africa and to some extent also in India, where it is called *bajree*. Pearl millet is of the tribe Paniceæ and is regarded as one of the millets. It is an annual which grows to a height of 8 to 10 feet, with spikes a foot long, which bear a large amount of grain. In India it is one of the most important cereals. As a fodder plant, pearl millet ranks high, though it is rather difficult to cure perfectly. It has been successfully grown in the United States as far north as Pennsylvania. A number of other species of *Pennisetum* are cultivated for their ornamental appearance. See SORGHUM, *Sorghum, Nonsaccharine.*

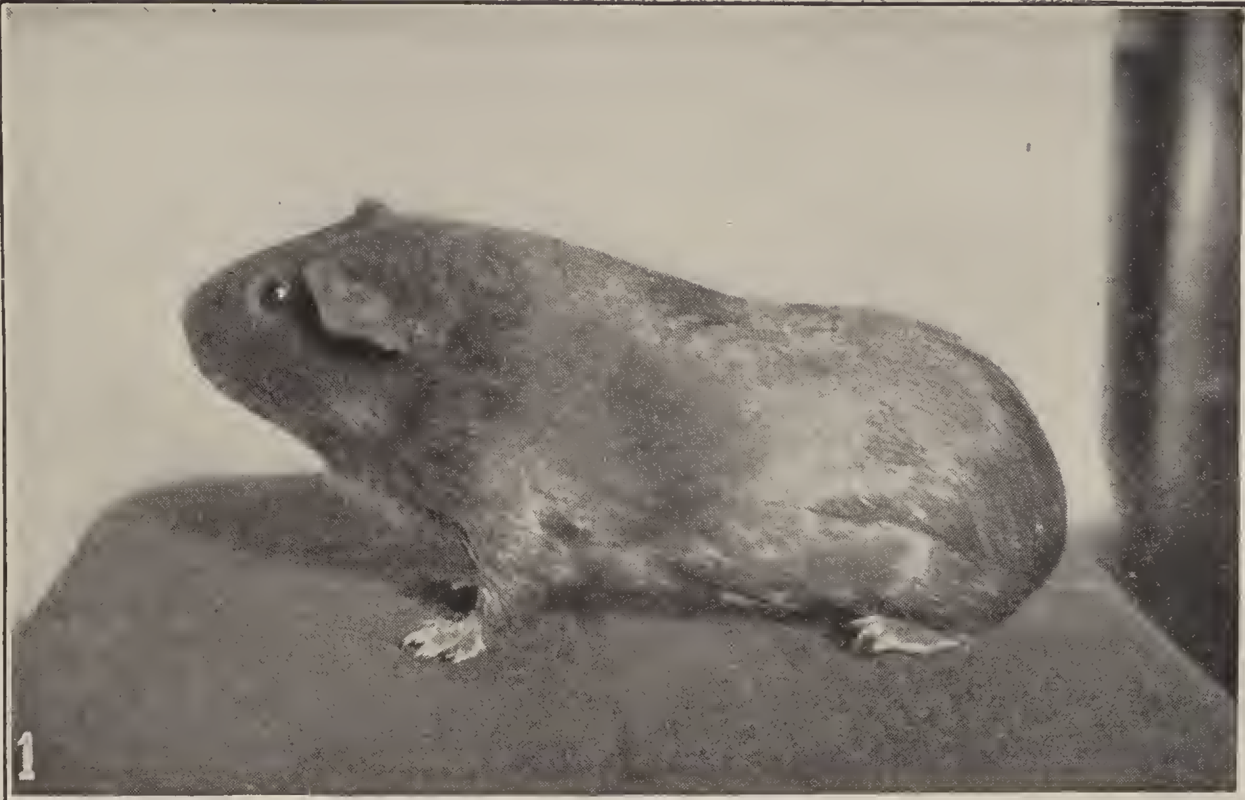
GUINEA FOWL. A group of birds, in some ways closely allied to the pheasants. The guinea fowls are usually regarded as a family, Numididæ, and are separated into several genera, including a score of species, all natives of Africa and Madagascar. They are usually placed between the pheasants and the turkeys and jungle fowls, but in many characters they stand alone. Nearest the typical pheasants in structure (from which the family differs in having the skin of the head more or less bare and wattled, in the absence of spurs, and in the fact that the plumage of the sexes is alike) are the crested guinea fowls of the genus *Guttera*. They have a jet-black plumage, dotted with small bluish-white or light-green spots, the bare skin of the neck blue, purplish, or scarlet, and the head crowned by a long, full black crest. There is also a ruff about the neck. The genus (or at any rate its best-known species, *Guttera cristata*, of the West African coast) possesses a unique structure in the fact that the head of its wishbone (the furcula), unlike that in all other Gallinæ, is in the form of a hollow cup which opens upward, into which the trachea, or windpipe, dips and emerges again. Another group contains the "helmeted" guinea fowls, of which the "common" species (*Numida meleagris*) is the type, the top of whose head is covered with a horny cap, or "casque," rising into a hard crest; the bare skin on the sides of the face, neck, and chin, as well as the wattles, are red, and the remainder of the neck is bluish and bristly. The plumage is black, thickly sprinkled with round white spots, to which the bird is said to owe its specific name, given to it by the Romans in fanciful allusion to the tears shed by the sisters of Meleager when he died. Its native home is West-Central Africa. Representing the group in South Africa are *Numida coronata*, a favorite game bird in Cape Colony, and *Numida papillosa*, more prevalent northeastward. Madagascar has a red-crowned species (*Numida mitrata*), now acclimatized and wild in Rodriguez, and Abyssinia a well-known form (*Numida ptilorhyncha*), without any red on the head, as have all the others, and regarded by Darwin (*Animals and Plants under Domestication*, 1875) as the source of our domestic races. The *Acryllium vulturinum* of Zanibar differs from all these and is the finest of the species. Its plumage is dark blue; it has hackles on the lower part of its neck and a long tail. Two other allied birds, essentially differing from the type by the possession of spurs on the feet, are the rare black guinea fowl (*Phasidus niger*) and the turkey guinea fowl (*Agelastes meleagrides*), both of the coast of equatorial West Africa and little known. All these agree in going about in large and noisy flocks, seeking their food on the ground, but roosting in trees. They are polygamous as a rule, make nests on the ground, and lay many eggs. They furnish good sport, and their flesh is excellent.

Domestic Races. Our domestic guinea fowls are no doubt derived in the main from the *Numida meleagris* above described and were among the fowls kept by both Greeks and Romans, who also may have domesticated the Abyssinian species. This fowl disappeared, however, with the decay of Roman civilization and was reintroduced into Europe, apparently by the Portuguese explorers of Africa, in the sixteenth century. To them we owe the substitution of the name "guinea fowl" for the ancient "meleagris," which became mixed up with the turkey, whose present names are thus doubly erroneous. It was early introduced into the Cape Verde Islands and also into several of the West Indies, where it soon ran wild. It slowly became common in Europe and thence has spread around the world, but has undergone little change beyond a tendency to albinism. These fowls are not popular, however, on account of their almost incessant and harsh cries, and because they are quarrelsome and difficult to rear; but the high price commanded in the market by both the birds and their eggs compensates those who keep guinea fowls for profit. The eggs are small and have a thick, strong shell, but are particularly esteemed. See PHEASANT, and Colored Plate with PEACOCK.

GUINEA GRASS (*Panicum maximum*, or *jumentorum*). A grass of the same genus as some of the millets, a native of the west of Africa, but now naturalized and extensively cultivated in the West Indies and in the southern United States and in the tropics generally. Its height in favorable moist situations is from 5 to 10 feet, or even more; in dry grounds it is smaller. It has a much-branched spreading panicle, long flat leaves, and a somewhat creeping rootstock. In countries favorable to its growth it is very valuable cattle food. In such regions, and upon good soil, the amount of forage this grass yields is very great; it may be cut every month. It has sometimes been confused with Johnson grass, from which it is distinct. Other species of the same genus are among the most useful pasture and forage grasses of tropical countries. See ANDROPOGON.

GUINEA PEPPER. A name variously applied to the seeds of dried fruit of several different plants, which agree in their peppery character and in the place of their production—West Africa. The name "Malaguetta (Malagheta, Meleguetta, etc.) pepper" is generally to be regarded as equivalent to "Guinea pepper," but properly is a designation of grains of paradise (*Amomum meleguetta*). The capsules or dry berries of *Capsicum frutescens* are commonly sold by druggists under the name "Guinea pepper." Both the names "Guinea pepper" and "Malaguetta pepper" have been applied to the

GUINEA PIGS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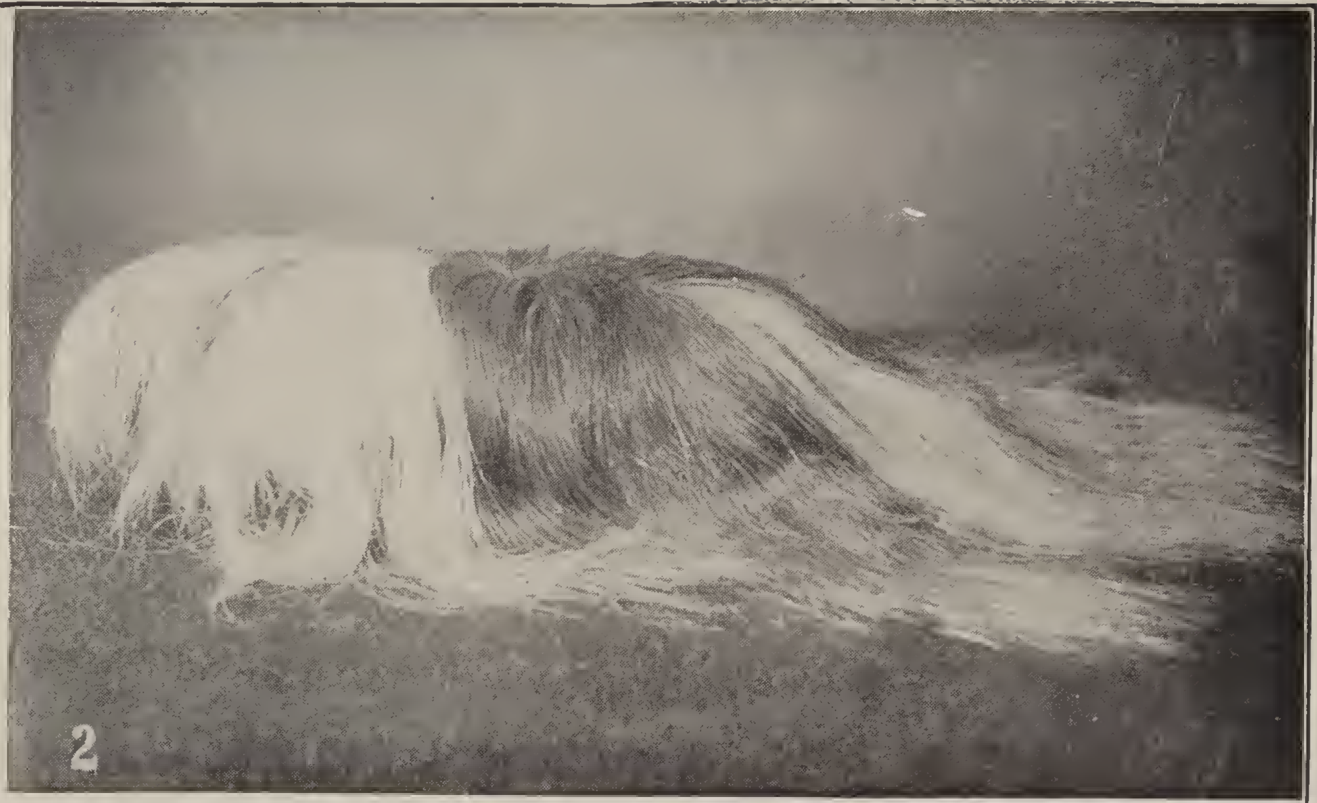
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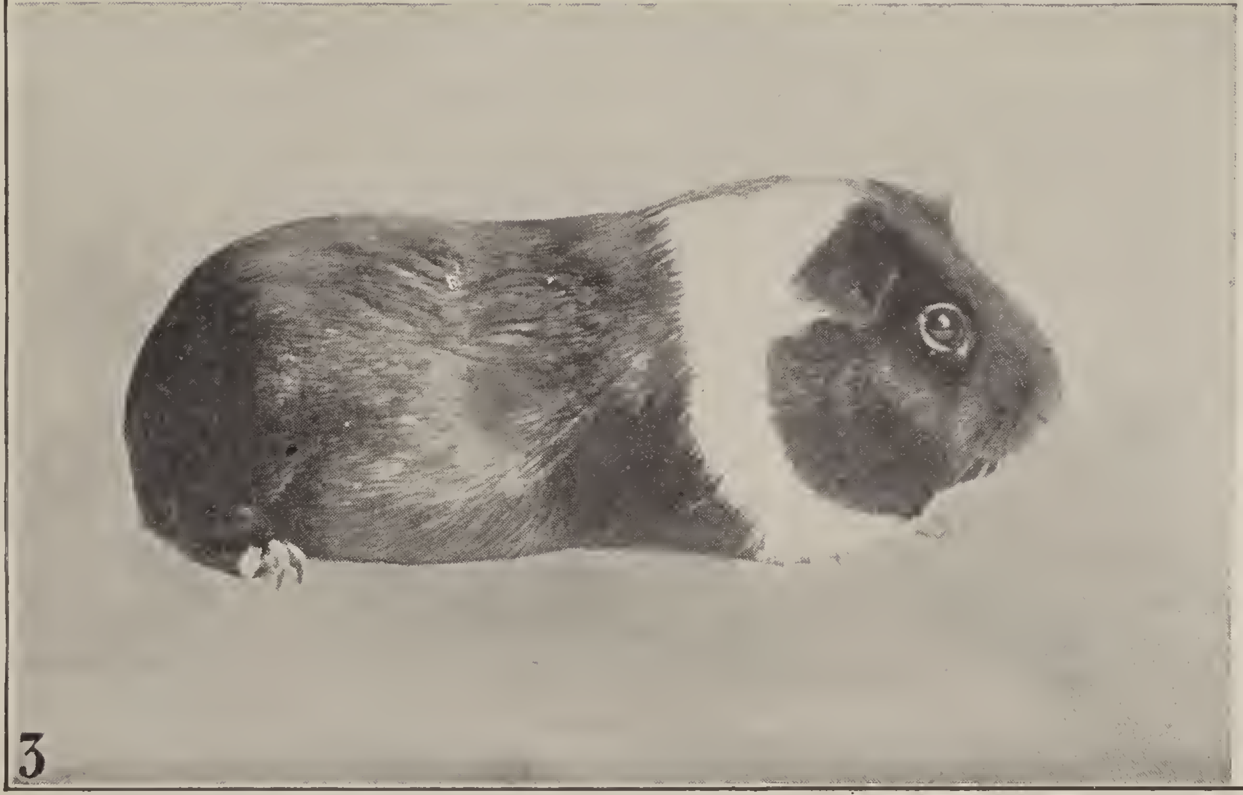
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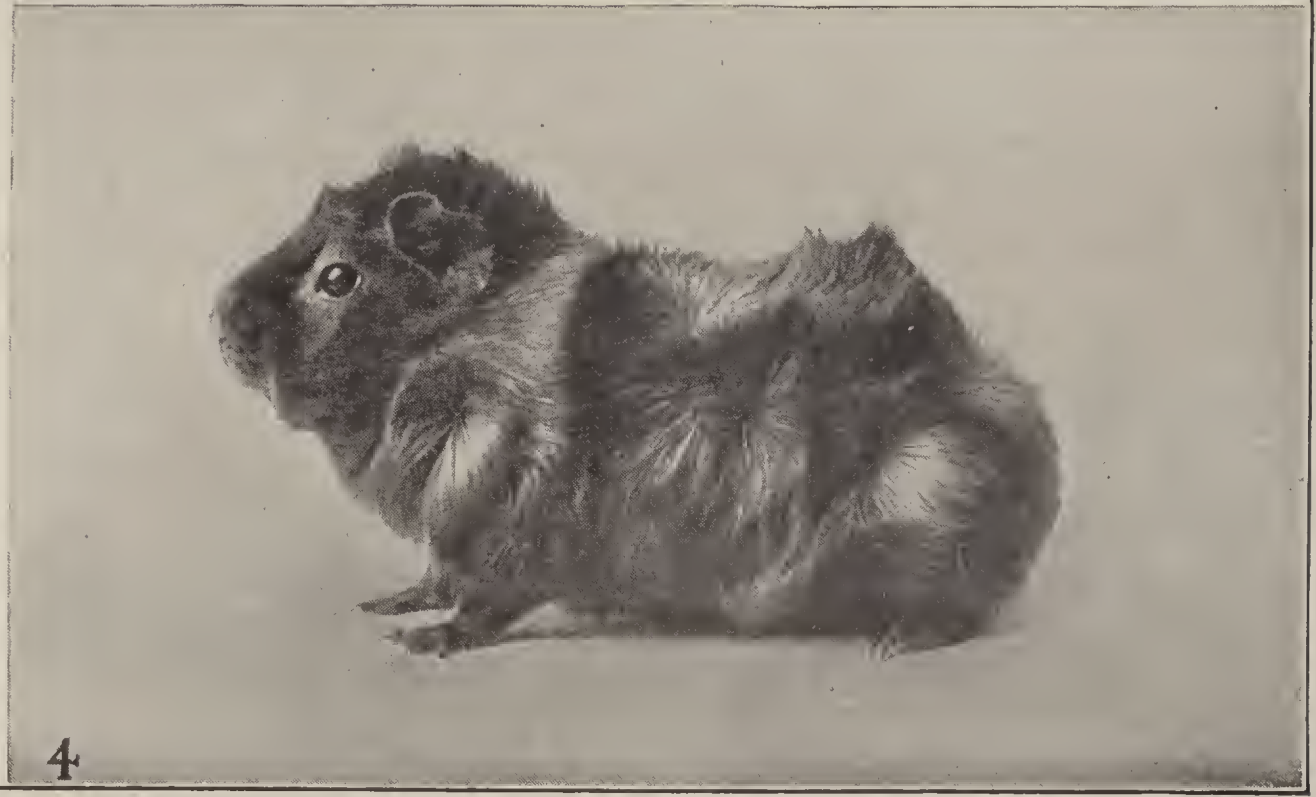
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1. ENGLISH CAVY, solid color (red).
2. PERUVIAN CAVY, broken color (tortoise and white).
3. ENGLISH CAVY, broken color (tortoise and white).
4. ABYSSINIAN CAVY (tortoise shell).

dried fruit of *Piper clusii*, and to the seeds of *Xylopia æthiopica*, a shrub of the family Anonaceæ. This last, sometimes called Ethiopian pepper, was at one time a considerable article of export from Guinea, but is now seldom heard of. It is an aromatic and not extremely pungent condiment. There is great difficulty in determining which of these kinds is meant in many instances in which the term "Guinea pepper" or "Malaguetta pepper" is employed by older writers; yet, from the importance of the trade in this article, the name "Grain Coast" was given to a great tract of land in the Bight of Benin, and to it the establishment of the settlements of Grand Bassa and Cape Palmas is due. Guinea pepper continued in request up to the close of the eighteenth century, and then the peppers of the East drove it from the market. See GRAINS OF PARADISE; CAPSICUM; CUBEB.

GUINEA PIG. A popular but incorrect name for a species of cavy (q.v.) abundant in domestication. Some authorities consider it a valid species, *Cavia cobaya;* but it is more probably only a domesticated form of the restless cavy (*Cavia aperea*, or *porcellus*) of Guiana and Brazil. The guinea pig is a small animal, about 6 inches long, usually black, white, and tawny. Recently it has been much used in bacteriological laboratories for the study of germ diseases, and it has long been a popular pet for children. It is exceedingly prolific. It may begin to breed at two months of age, and there may be 4 to 12 in a litter. The young, which are produced five or six times a year, are very precocious, shedding the milk teeth before they are born. These animals are not pigs, but much more nearly rabbit-like rats; nor are they found in Guinea, but are confined to South America. The "guinea" may be a corruption of "Guiana," while "pig" is as accurate as many other popular names. Consult Lantz, "Raising Guinea Pigs," in *Farmers' Bulletin No. 525, United States Department of Agriculture* (Washington, 1913), and W. E. Castle, *Reversion in Guinea Pigs and its Explanation* (ib., 1913).

GUINEA WORM. A parasitic roundworm (q.v.) (*Dracunculus, or Filaria, medinensis*), especially characteristic of the central and eastern parts of Arabia, but abundant in India, Persia, Nubia, the swampy regions of the White Nile, and Guinea, and found widely distributed in the warmer parts of both hemispheres. Sailors have been known to bring them into New England ports. The adult worm is whitish in color and only 1 or 2 millimeters in thickness, although it is sometimes a meter in length. The eggs are laid in water, but the young only reach maturity in the human body, where they come to lie under the skin, in the connective tissue, especially of the extremities, often producing painful sores and causing the disease filariasis (or dracontiasis), which is accompanied by emaciation and debility. The female is viviparous, while the male is unknown. Carter regards a small worm (*Urolabes palustris*), frequenting brackish waters, as the immature form of the guinea worm. It is also believed that the embryos enter the bodies of water fleas (*Cyclops*, etc.) and there molt, and that consequently they may be introduced into the body by drinking standing water; but this has not been proved. Other species of *Filaria* occur in the tropics, one of which (*Filaria sanguinis-hominis*) is said to be the cause of the disease elephantiasis (q.v.). This is a worm of microscopic size, found living in the blood of the mosquito in India and China. It is said that the eggs are swallowed in the water drunk by man, are hatched in his intestines and obstruct the smaller blood vessels, thus causing the disease named, and perhaps even leprosy. Other species of *Filaria* live in the peritoneum of the horse and of apes, and an immature form (*Filaria lentis*) has been detected in the lens of the human eye. See FILARIA.

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GUINEGATE, gḗ′n'-gȧt′, or **ENGUINEGATTE**, äɴ′gḗ′n'-gȧt′. A small village in the French Department of Pas-de-Calais, noted as the scene of two defeats of the French, by Maximilian of Austria, Aug. 17, 1479, and by Henry VIII and Maximilian, Aug. 16, 1513, the latter engagement being known as the "Battle of the Spurs." Pop., 1901, 481; 1911, 456.

GÜINES, gwē′nȧs. A town of Cuba in the Province of Havana, about 30 miles southeast of Havana, with which it is connected by steam and electric railways (Map: Cuba, C 4). It has some trade in sugar and coffee. In the eighteenth century Güines was the name of a large hacienda, occupying the entire plain, in the middle of which the town was founded by the families of the laborers. It became a chartered town in 1814, but was destroyed by fire in 1817 and did not acquire any importance until 1838, when it became a railroad terminus. It is now well built and has several notable buildings. Pop., 1907, 8053.

GUINEVERE, gwĭn′ḗ-vẽr (Welsh *Gwenhwyfar;* OEng. *Gaynore*). A famous figure in the later Arthurian romances. In the earlier versions of the legend her personality is scarcely developed. In the *Vita Gildæ* there is indeed a queen whom King Melvas carries off from Arthur to Glastonbury, to be recovered only after a year's search and a siege. In Geoffrey of Monmouth she appears as Guanhumara, "of a noble Roman family, and surpassing in beauty all the women of the island," and she takes the veil after Arthur's defeat by Mordred. As Wenhaver in Layamon's story, she gains little distinctness. It is not till the romance is completed, whether by Walter Map or by Chrétien de Troyes, with the magnificent invention of Lancelot, and of her sinful but romantic love for him, that she reaches her full proportions and becomes "the first perfectly human woman in English literature." The story was treated by other mediæval writers; an incident given by them but omitted by Malory (that describing her first avowal of her love for Lancelot) plays a crucial part in Dante's famous episode of Francesca da Rimini. The character was powerfully treated by Tennyson in the *Idylls of the King*, and a phase of it by William Morris, who, in his *Defense of Guenevere*, remains truer to the original conception of it. Consult: Rhys, *Studies in the Arthurian Legend* (Oxford, 1891); Weston, *Legend of Sir Lancelot du Lac* (London, 1901); Bräuner, *Der altfranzösische Prosaroman von Lancelot del Lac* (Marburg, 1911). See ARTHUR; LANCELOT.

GUINEY, gī′nĭ, Louise Imogen (1861–). An American poet and essayist, born in Boston. The daughter of Gen. Patrick R. Guiney, she was educated in Providence. Her more noteworthy volumes of poetry are: *Songs at the Start* (1884); *The White Sail and Other Poems* (1887); *The Martyr's Idyl, and Shorter Poems* (1899). She wrote also much in prose and, notably: *Monsieur Henri, a Footnote to French History* (1892); *A Little English Gallery* (1894); *Patrins: A Collection of Essays* (1897); *Hurrell Froude* (1904). She edited editions of J. C. Mangan and of Matthew Arnold, and shared with Mrs. Spofford and Alice Brown the authorship of *Three Heroines of English Romance* (1894).

GUINGAMP, găɴ′găɴ′. The capital of an arrondissement in the Department of Côtes-du-Nord, France, on the Trieux, 20 miles northwest of Saint-Brieuc (Map: France, N., B 4), and formerly the capital of the Duchy of Penthièvre. Among its relics are the ruined walls and the ducal castle. The town is noted for its pilgrimage church of Notre Dame de Bon Secours, at which a great "annual pardon" is given. A restored fifteenth-century fountain, a religious college, a mathematical school, and a museum are also noteworthy. Guingamp—whence gingham—has the original manufactories of that linen fabric, hat factories, tanneries, and a considerable cattle and agricultural trade. Pop., 1901, 9252; 1911, 9385.

GUINICELLI, gwē′nē-chĕl′lē, Guido (c.1240–c.76). An Italian poet, born in Bologna. He seems to have practiced law in his native city. A Ghibelline, he was banished with the rest of the Lambertazzi party in 1274 and died in exile. Dante considers him the father of Italian poets. He was the head of that school of idealistic love poetry to which belong Lapo Gianni, Cino da Pistoja, Guido Cavalcanti, Dino Frescobaldi, and Dante. To the conventionalized troubadour poetry he brought sincerity of feeling, mysticism, and a philosophical spirit. Of his verse only seven canzoni and five sonnets remain. The best known of them is the canzone of *The Gentle Heart* (as translated by D. G. Rossetti). These are printed in Nannucci, *Manuale della letteratura del primo secolo della lingua italiana* (Florence, 1843). Consult: Grion, *Guido Guinicelli e Dino Campagni* (Bologna, 1870); Cassini, *Le rime dei poeti Bolognesi del secolo XIII* (ib., 1881); D. G. Rossetti, *Dante and his Circle* (London, 1874); Maria Cenni, *I due Guidi; studio critico-letterario* (Aquila, 1893); A. Bongiovanni, *Guido Guinizelli e la sua riforma poetica* (Venice, 1896); Maria Ferrai, *La poesia amorosa* (Siena, 1900).

GUINNES, A. G. de. See Gill, A.

GUINOBATAN, gē′nō-bä′tän. An inland town of Luzon, Philippines, on the Inaya River, in the Province of Albay. It lies about 9 miles northwest of Albay (Map: Philippine Islands, D 4). Pop., 1903, 20,027.

GUIPURE. See Lace.

GUIRAUD, gē′rō′, Ernest (1837–92). A French dramatic composer, born in New Orleans, La., of French parentage. His first studies were under his father (a music teacher, and the winner of the Prix de Rome in 1827), and later (1849) he studied in Paris under private teachers. In 1852, when but 15 years of age, he returned to New Orleans and superintended the production of his first opera, *Le roi David*, after which he went back to Paris and made it his permanent home. He studied at the Conservatory, and won the Grand Prix de Rome with his *Bajazet et le joueur de flûte* in 1859. He served throughout the Franco-Prussian War of 1870–71 and in 1876 became a member of the faculty of the Paris Conservatory. He was the composer of many successful operas, among them *Sylvie* (1864), *Le Kobold* (1870), *La galante aventure* (1882); orchestral suites, and minor compositions, as well as of a solemn high mass. He died in Paris. *Brunhilde*, an unfinished opera, was completed by Saint-Saëns and produced in Paris as *Frédégonde* (1895).

GUIRIOR, gē′rē-ōr′, Manuel, Marqués de (1708–88). A Spanish mariner and provincial governor, born in Aoiz de Ugarte, Navarra. Entering the navy in 1733, he passed through all the grades and reached the rank of chief of squadron in 1769. In 1771 he was made Viceroy of New Granada and President of the Audiencia of Santa Fé. Here he devised better means of securing supplies and provided for the progress of commerce and agriculture. He was made lieutenant general in 1774 and the next year was appointed Viceroy of Peru, taking possession of the office Dec. 6, 1776. During his administration in Peru he favored the mining industry, protected the Indians, and suppressed a number of revolts. In 1780 he was removed from office on account of charges made by the Visitador Areche, although these were never proved, and in the same year he returned to Spain, where he spent his last years. His "Memoria" as Viceroy of New Granada is published in J. A. García y García's *Relaciones de los Virreyes del Nuevo Reino de Granada* (New York, 1869), and as Viceroy of Peru in S. Lorente, *Relaciones de los Virreyes y Audiencias . . . Perú* (Lima, 1867–72).

GUISBOROUGH, gĭz′brŭ. A market town in the North Riding of Yorkshire, England, on the North Eastern Railway, 7½ miles east-southeast of Middlesborough (Map: England, F 2). Neighboring mines supply the Cleveland iron ore used in steel founding, which constitutes its chief industry. Its historical interest centres in the ruins of the Augustinian priory, built in 1119 by Robert de Brus, grandfather of King Robert Bruce, and up to the time of its dismantlement by Henry VIII one of the wealthiest of English monastic institutions. Pop., 1901, 5650; 1911, 7061. Consult *Cartularium Prioratus de Gyseburne, Fundati A.D. 1119* (Durham, 1889).

GUISCARD, gēs′kär′, Robert (c.1015–85). Duke of Apulia and Calabria. He was the son of Tancred of Hauteville and was born near Coutances in Normandy. His elder brothers, William of the Iron Arm, Drogo, and Humphrey, had gone to Italy to seek their fortunes about 1030 and had been very successful. Robert followed them about 1046, but was badly received by them. At first he served under the Prince of Capua and then acted as the leader of a band of adventurers, endeavoring to secure possessions for himself in Calabria. In 1053 he took a prominent part in the battle near Civitate, in which the papal forces, led by Leo IX, were defeated by the Normans. In 1057, after the death of Humphrey, Robert became Count of Apulia. About this time he was joined by his brother Roger, who aided him greatly in his conquests. In 1059 Robert concluded a treaty with Pope Nicholas II, who made him Duke of Apulia and Calabria, and "future lord" of Sicily if he could conquer the island. Robert, "Duke by the grace of God and of St. Peter," became the Pope's vassal. This gave the papacy a feudal supremacy over southern Italy which lasted for centuries. In 1060 Roger engaged in the subjugation of Sicily. He was joined in the following year by Robert, and Messina was captured. The conquest proceeded slowly. Palermo was taken in 1072, and the subjugation of the island was not completed till about 1090, long after the death of Robert. On the southern mainland, however, the supremacy of the Normans was firmly established by the capture of Tarentum and Reggio in 1068 and Bari in 1071. In 1074 Robert incurred excommunication by attacking Benevento, which was a papal possession; but in 1080 there was a reconciliation between Gregory VII and the Norman Duke, who renewed the oath which he had made in 1059. After establishing a magnificent principality on the ruins of the Byzantine power in southern Italy, Robert proceeded to invade the territory of the Byzantine Empire in the Balkan Peninsula, acting as the champion of the heir of Michael VII, who had been deposed by Alexius Comnenus. In 1081 he gained a great victory over Alexius at Durazzo and captured the city. The war in Macedonia and Thessaly was carried on mainly by his son, Bohemund (q.v.). From his victorious campaigns Robert was recalled in 1085 to the aid of Gregory VII, who was besieged in the castle of Sant' Angelo by Henry IV (q.v.). Robert captured and sacked Rome, many of the inhabitants being killed or sold into slavery. He then prepared to renew the war against Alexius, but died at Cephalonia (July, 1085). He is described by Anna Comnena (q.v.) as of lofty stature, large frame, and commanding appearance. He was extremely brave, ambitious, and shrewd, but pitiless. The surname Guiscard (sly) is said to have been given him because of his ability and craft. Consult Chalandon, *Histoire de la domination normande en Italie et en Sicile* (2 vols., Paris, 1907), and Heinemann, *Geschichte der Normannen in Unteritalien und Sizilien* (Leipzig, 1894).

GUISCARD, Roger. See Roger I.

GUISCHARD, gē'shär', Karl T. See Guichard.

GUISE, gü'ēz' (ML. *Guisia*). A town in the Department of Aisne, France, on the left bank of the Oise, 31 miles north of Laon (Map: France, N., J 3). It is strongly fortified, has the ruins of a sixteenth-century castle, from which the famous dukes of Guise (q.v.) derived their title, and a statue of Camille Desmoulins, who was born here in 1762. Its industrial feature is the coöperative stove factory founded by J. B. A. Godin, a disciple of Fourier, which employs about 1500 hands, and its *familietère*, or workman's colony, with a phalanstery, or common dwelling house, accommodating 400 families. The foundation also includes a board of trade arbitration. Other manufactures are yarn, textiles, and beer. Pop., 1901, 7310; 1911, 8099. Guise was a noted strategical place as early as the eleventh century. It gave its name to a county, which later was erected into a duchy. The town was burned by the English under John of Hainault in 1339, but their assaults on the castle were foiled by his daughter, wife of the lord of the fortress. Guise was taken by the Germans in their advance toward Paris just after the outbreak of the European War in 1914. See War in Europe.

GUISE. The name of the most famous branch of the ducal family of Lorraine, the members of which played a prominent part in the history of France and Europe during several centuries. The family derived its name from the town of Guise (q.v.) and claimed an ancestry reaching back to Merovingian times. In 1333 Marie of Blois married Rodolf, Duke of Lorraine, and brought with her as part of her dower the County of Guise. The following are the most celebrated members of the Guise family: Claude de Lorraine (1496–1550), first Duke of Guise, Count of Aumale, Marquis of Mayenne and Elbœuf, and Baron of Joinville, was the fifth son of René II, Duke of Lorraine. He was endowed by his father with the French fiefs of the family, while Lorraine went to his elder brother. Claude accompanied Francis I in all his Italian campaigns, receiving a severe wound in the battle of Melegnano (1515). Eight years later he drove the Imperialists from Champagne. In 1527 he became Duke of Guise, a peer of France, and Governor of Champagne as a reward for his suppression of the peasant revolt. In 1542 he fought in Flanders under the Duke of Orléans. He married Antoinette de Bourbon, and his daughter Mary was the wife of James V of Scotland, and mother of Mary, Queen of Scots.—François de Lorraine, second Duke of Guise, son of the preceding, and known as *la Balafré* (the Scarred), was born Feb. 17, 1519. He won world-wide renown as a brave and skillful soldier, distinguishing himself at Montmédy (1542), Landrecies (1543), Saint-Dizier (1544), and at Boulogne (1545), and by his successful defense of Metz for two months in 1552 against Charles V. In 1557 he had command of the expedition against the Spaniards in Italy, which failed through lack of proper support. The Duke was recalled and in 1558 took Calais, the last stronghold of the English in France. His niece, Mary Stuart, being the wife of Francis II, he enjoyed for a time the highest power at court. After the death of the King the jealousy of the queen mother, Catharine de' Medici (q.v.), forced him into temporary retirement, but with the Constable Montmorency and Marshal Saint-André he formed the coalition known as the Triumvirate. It is probable that he instigated the massacre of Huguenots at Vassy, March 1, 1562, which marked the beginning of the civil wars. He took Rouen and won a victory at Dreux (Dec. 19, 1562), but was assassinated (February, 1563) by a Protestant fanatic, Poltrot de Méré. Guise cannot be cleared from the charge of cruelty and ferocity, though he was doubtless much influenced by his brother Charles, the Cardinal of Lorraine. He had a taste for literature, and his memoirs have considerable historic interest.—Charles de Lorraine, brother of the preceding, was born Feb. 17, 1525. He entered the Church, became Archbishop of Rheims in 1538, and was created Cardinal in 1547. He was known as the Cardinal of Guise until the death of his paternal uncle, when he took the title of Cardinal of Lorraine, by which he is known in history. He was deeply involved in the political intrigues of the time and inspired much that was worst in the policy of his house, of which he became practically the head after the assassination of his brother. His vacillation and cowardice rendered him inefficient as a leader, and his influence declined from the moment when he became responsible for the execution of his own designs. He introduced the Inquisition into France in 1558, and the responsibility for the cruel excesses following the tumult of Amboise (1560) rests upon him. He was licentious in his private life. His brother LOUIS (1527–78) received the title of Cardinal of Guise after Charles became Cardinal of Lorraine, but was a figure of little importance historically.—HENRI I DE LORRAINE, third Duke of Guise, son of François de Lorraine, was born Dec. 31, 1550. At the age of 15 he distinguished himself fighting against the Turks in Hungary. He fought against the Huguenots at Saint-Denis (1567), Jarnac (1569), and Moncontour (1569), and forced Coligny to raise the siege of Poitiers. He aspired to the hand of Margaret of Valois, but, to appease the anger of the young King, Charles IX, he married Catharine of Cleves (1570). He left the court because of the favor shown to the Huguenots, but soon returned and took an active part in the Massacre of St. Bartholomew, leading in person the assault upon the house of Coligny, whose body was thrown at his feet in the courtyard. In the fight against the Huguenots at Dormans (Oct. 10, 1575) he received a wound which left a scar from which he was given his father's sobriquet, *le Balafré*. For his part in this battle he became an object of unreasoning idolatry on the part of the Parisians, and he used this shrewdly to advance the power of his house. It soon became common talk that the Valois were illegitimate and the Lorraines the true heirs of Charlemagne. Guise was a prime mover in the formation of the Holy League (1576), the primary object of which was to shut the Bourbons, whose head was Henry of Navarre, out of the succession and to bring in the Guises. The League became dormant, but was revived in 1584, and entered into alliance with Philip II of Spain by the Treaty of Joinville, to uphold the Catholic cause. Henry III wavered between the equally dangerous parties of Bourbon and Guise, but finally decided first to put down the Huguenots, and came to an agreement with Guise at Nemours. In the following War of the Three Henrys Guise defeated the German allies of the Huguenots at Vimory and Auneau (1587), while the royal forces were defeated by those of Henry of Navarre. On account of the increasing popularity of Guise the King ordered him to keep away from Paris; but he defied this command, and there followed the Day of the Barricades in Paris (May 12, 1588), when the King of France and Guise, who was called the King of the Parisians, were arrayed against each other. Finally the King retired to Blois and summoned the Estates, appearing to yield to his defiant vassal, who was induced to go to Blois and to respond to a summons of the King to a private audience in the royal cabinet. There he was assassinated by members of the royal guard, the famous Forty-Five, Dec. 23, 1588. His brother, another Cardinal of Lorraine (1555–88), was arrested and put to death on the following day.—CHARLES DE LORRAINE, Duke of Mayenne, born March 26, 1554, was brother of Henri I de Lorraine, under whom he fought in the Huguenot wars, distinguishing himself at Moncontour and Brouage. After the assassination of his brother he went to Paris and took command of the forces of the League, which he organized more thoroughly than they had ever been before. He proclaimed the Cardinal of Bourbon King and made himself lieutenant general of the kingdom. He was defeated by Henry IV at Arques (1589) and Ivry (1590), but carried on the struggle until 1596, when he made his submission to the King and was one of his most loyal subjects until his death, in 1611.

CHARLES DE LORRAINE (1571–1640), son of Henry I and fourth Duke of Guise, was succeeded by his second son, HENRI II DE LORRAINE, fifth Duke of Guise, who was born April 4, 1614. Henri had been trained for the Church and was Archbishop of Rheims when the death of his elder brother (1639) caused him to abandon ecclesiastical life. He was brilliant, but fickle in his attachments and noted for many amours. He joined the league of the Count of Soissons against Richelieu (1641) and took refuge in Brussels, returning only after the death of Richelieu and Louis XIII. He went to Naples during the revolt of Masaniello, hoping to conquer a kingdom, but was made a prisoner by the Spaniards (1648). He was set at liberty in 1652 and joined the opponents of Mazarin, but soon betrayed them, and after numerous vicissitudes returned to Paris, was made Grand Chamberlain, and directed the fêtes of Louis XIV. He died in 1664. His *Mémoires* (2 vols., 1669) were really written by his secretary, Saint-Yon, and by Count Raymond of Modena. Henri II was succeeded by his nephew, LOUIS JOSEPH, Duke of Guise, Joyeuse, and Angoulême. When the son of the latter, FRANÇOIS JOSEPH, died in 1675, the direct line of the dukes of Guise of the house of Lorraine became extinct. The family possessions passed to the house of Condé, the next of kin.

Bibliography. Consult: Forneron, *Les ducs de Guise et leur époque* (Paris, 1893); Bouillé, *Histoire des ducs de Guise* (ib., 1849–50); Brisset, *François de Guise* (ib., 1840); Cauvin, *François de Lorraine, duc de Guise* (ib., 1885); Valincourt, *Vie de François de Guise* (ib., 1881); De Croze, *Les Guises, les Valois, et Philippe II* (ib., 1866); Renauld, *Henri de Lorraine, duc de Guise* (ib., 1879); Ruble, *L'Assassinat de François de Lorraine, duc de Guise* (ib., 1897), which contains a list of manuscript sources relating to the house of Guise; Zeller, ed., "Charles IX et François de Guise, extraits des lettres de Catherine de Medicis," in *L'Histoire de France racontée par les contemporains* (ib., 1887). See FRANCE; HUGUENOTS; LORRAINE.

GUISLAIN, A. M., BARON LIMNANDER DE NIEUWENHOVE. See LIMNANDER DE NIEUWENHOVE.

GUITAR, gĭ-tär′ (OF. *guiterre, guiterne*, Fr. *guitare*, from Lat. *cithara*, Gk. *κιθάρα, kithara*, lyre). A musical stringed instrument, somewhat like the lute, particularly well adapted for accompanying the human voice and much esteemed in Spain and Italy. It has six strings, tuned as follows: E, A, d, g, b, e^1. Its compass is over three octaves, from E to a^2. The music of the guitar is always written in the G clef, and thus the actual sound is an octave lower than written. The sound is produced by the fingers of the right hand plucking the strings, which are stopped by the fingers of the left hand pressing them against the frets. The three highest strings of the guitar are usually of gut, and the three lowest are of silk spun over with silvered wire.

GUITAR FISH (so called from the shape of the fish). A long-nosed, sharklike ray of the family Rhinobatidæ. It differs from the Raiidæ mainly by the peculiarity that the eggs are hatched within the body. Like the sharks, the entire body is uniformly covered with shagreen.

There are numerous species in tropical waters, most of them olive gray in color. They feed on small bottom-living animals. The name is copied from the Spanish *guitarro,* applied especially to species of the Gulf of California. The best known is the California *Rhinobatus productus.* A familiar form from Jamaica to Brazil is the pureque, or fiddler fish (*Rhinobatus percellens*). See Plate of RAYS AND SKATES.

GUITEAU, gē̇-tō′, CHARLES J. See GARFIELD, JAMES A.

GUITGUIT, gwĭt′gwĭt′. See GUIDGUID.

GUITRY, gĭ′trĭ, LUCIEN (1860–). A French actor, born in Paris. He spent nine years in St. Petersburg (Petrograd) at the Michel Theatre. Upon returning to Paris he became, in turn, manager of the Porte Saint-Martin, stage director of the Comédie Française, and director of the Renaissance. At Coquelin's death he was given the part of Chantecler in the play of that name by Rostand. He was not successful in the interpretation of that character, which was little suited to an actor regarded as among the leaders, if not the leader, in the drama of modern reality. Among his best interpretations were *Samson, Le voleur, L'Emigré, Servir.* He also played the title part in *Kismet* in a French adaptation.

GUITRY, SACHA (1885–). A French dramatist, son of Lucien Guitry, born in St. Petersburg (Petrograd). He was educated at various lycées, among them the famous Janson de Sailly. He wrote a number of plays which were acted at the Odéon, Capucines, Réjane, and Antoine theatres. They are all light in character: *Le page* (1901); *Le mari qui faillit tout gâter* and *Nono* (1905); *Chez les zoaques* (1906); *La clef* (1907); *Le muffle* (1908); *La prise de Berg op zoom* (1912).

GUITTONE D'AREZZO, gwē̇-tō′nȧ̈ dȧ-rĕt′sō̇ (c.1230–c.1294). An Italian poet, born near Arezzo. It is a legend that in his youth he devised independently the sonnet form. His early verse is in the troubadour style, but later, in accordance with the change which came over him when he entered a religious order, he wrote on theological and political subjects, exhorting his fellow citizens to well-doing. Although the form is rough, the nobility of the sentiments he expressed exerted an influence on his contemporaries. His prose has the same faults as his verse, and in addition that of affectation. It was he who in 1293 founded the monastery Degli Angeli in Florence. His letters, in a curious baroque style, were published in 1745. The best edition of his works is that by Valeriani, *Rime di Fra Guittone d'Arezzo* (Florence, 1828, 1867). Consult Romanelli, *Di Guittone e delle sue opere* (Campobasso, 1875).

GUIUAN, gē′wȧn. A town of Sámar, Philippine Islands, situated at the southern extremity of the island, about 78 miles southeast of Catbalogan (Map: Philippine Islands, E 5). Its harbor will admit vessels of 28 feet draft. Pop., about 12,000.

GUIZOT, gwē̇′zō̇′, by foreigners commonly pronounced gē̇′zō̇′, ELIZABETH CHARLOTTE PAULINE (DE MEULAN) (1773–1827). A French author, the first wife of Guizot the historian. She was born in Paris. Her father having died when she was 18 years of age, she sought subsistence for herself and the straitened family by literary labor. She published *Les contradictions,* a novel, in 1800; afterward joined the staff of Suard's journal, *Le Publiciste,* and as literary and artistic editor became known for her critical articles, a selection of which were published in 1802 as *Essais de littérature et de morale.* Ill health would have interrupted the series in 1807, had they not been continued by an anonymous writer, who later revealed himself as Guizot. The friendship thus begun resulted in their marriage in 1812, and during their married life she was of great assistance to her husband in his historical studies and literary work. Her subsequent writings, devoted to the moral improvement and education of the young, are: *Les enfants* (1812); *Le journal d'une mère* (1813); *L'Ecolier, ou Raoul et Victor* (1821); *Nouveaux contes à l'usage de la jeunesse* (1823); *Education domestique, ou Lettres de famille sur l'éducation* (1826). Her husband published several posthumous volumes of her essays and other writings. Consult Sainte-Beuve, *Portraits de femmes* (Paris, 1844).

GUIZOT, FRANÇOIS PIERRE GUILLAUME (1787–1874). A distinguished French historian and statesman, born at Nîmes, Oct. 4, 1787, of Protestant parents. His father was an advocate of liberal views, was guillotined during the Reign of Terror (April 8, 1794), and his mother soon afterward went with her two sons to Geneva, where young Guizot received his education. In 1805 he went to Paris to study law, but instead devoted himself to literature. His first work, the *Nouveau dictionnaire universel des synonymes de la langue française,* appeared in 1809 and was quickly followed by an essay on the fine arts and a translation of Gibbon. In 1812 he married Mademoiselle de Meulan, who was the editor of *Le Publiciste,* and 14 years his senior. In the same year he became a professor of history at the Sorbonne. After the Restoration he became General Secretary in the Ministry of the Interior and subsequently Secretary in the Ministry of Justice. Guizot contributed to the dissolution of the Chambre Introuvable (q.v.) by a memorial which was placed in the hands of Louis XVIII by Decazes. The latter committed to him the general direction of the administration of the communes and departments (1819). Guizot then attached himself to the Constitutional party, whose leaders were subsequently known as doctrinaires (q.v.), expounding its principles in his essay, *Des moyens de gouvernement et d'opposition dans l'état actuel de la France* (1821). In 1821–22 he published his *Histoire des origines du gouvernement représentatif,* containing his lectures at the Sorbonne. Owing to his attacks on the Villèle ministry, Guizot lost his official position and for a number of years devoted himself to literary work. His *Histoire de la révolution d'Angleterre* appeared in 1827, and he edited the *Encyclopédie Progressive* and the *Revue Française,* which he established in 1828. His first wife having died (1827), he married her niece. In 1829 the Martignac ministry granted him permission to resume his lectures on history. They were attended by large and enthusiastic audiences and gave rise to several historical works of great value, published under the collective titles of *Cours d'histoire moderne* (1828–30), which included the *Histoire de la civilisation en France* and the *Histoire générale de la civilisation en Europe.* In January, 1830, he was elected to the Chamber of Deputies from Lisieux and sided with the opposition, vigorously attacking the Polignac ministry. After acting as Minister of Education in the provisional government which succeeded the overthrow of the Bourbons, he was made Minister of the Interior (Aug. 11, 1830), but resigned in November. He was Minister of Public Instruction in the cabinet formed by Soult in 1832 and held that position, with a brief interval, until 1837. In this capacity he did much for the improvement of educational institutions, particularly for the primary schools. During the Oriental crisis of 1840 arising from the ambitions of Mehemet Ali (q.v.) of Egypt, Guizot was sent as Ambassador to London, where he met with a cordial reception and returned to France in October of the same year, on the resignation of the Thiers ministry, to become Minister of Foreign Affairs and the chief of Louis Philippe's supporters, as the virtual head of the Soult ministry. After Soult's retirement, in September, 1847, he became the official head of the cabinet, which, however, although Guizot by his conduct, both in home and foreign affairs, had done all that was possible to make constitutional government a success in France, could not much longer retain its hold upon the people. He was bitterly opposed to universal suffrage, believing that extreme democracy would lead to tyranny. In many ways he was an ideal representative of the Liberal middle class which governed France in the reign of Louis Philippe. When the latter was overthrown in 1848, Guizot escaped from Paris to London. In April, 1849, he published a circular in which he offered his services to the electors of France. He returned to France in November, 1849, but was defeated as a candidate for the Chamber. The coup d'état of Dec. 2, 1851, put an end to his political career. The rest of his life was passed in retirement and was devoted to historical and literary work. He lived to see many changes in France and died, at the age of 87, at his villa in Val-Richer, Sept. 13, 1874. By founding the *Comités historiques*, by bringing about the publication of important historical documents, and by his own writings and lectures, Guizot did much for historical study in France. A work on Washington, published under the title *Vie, correspondance et écrits de Washington* (Paris, 1839–40), procured him the honor of having his portrait placed in the Chamber of Representatives at Washington. Of Guizot's numerous works the most important, in addition to those already mentioned, are: *De la démocratie en France* (1849); *Etudes biographiques sur la révolution d'Angleterre* (1851); *Etudes sur les beaux-arts* (1851); *Corneille et son temps* (1852); *Shakespeare et son temps* (1852); *Histoire de la république d'Angleterre et d'Oliver Cromwell* (1854); *L'Amour dans le mariage* (1855); *Histoire parlementaire de France* (1863); *Méditations sur la religion chrétienne dans ses rapports avec l'état actuel des sociétés* (1865–68); *Mélanges biographiques et littéraires* (1868); *Mélanges politiques et historiques* (1869). For the life of Guizot, the most valuable materials are his own *Mémoires pour servir à l'histoire de mon temps* (Paris, 1858–65; Eng. trans., London, 1858–62); Madame de Witt (Guizot's daughter), *Monsieur Guizot dans sa famille et avec ses amis* (Paris, 1880; Eng. trans., London, 1880); Simon, *Thiers, Guizot, Rémusat* (Paris, 1885); Bardoux, "Guizot," in *Les grands écrivains français* (ib., 1894); Crozals, "Guizot," in *Classiques populaires* (ib., 1891); Wilson, "M. Guizot and his Memoirs," in *Studies in Modern Mind and Character* (London, 1881); Mazade, *Portraits d'histoire morale et politique du temps* (Paris, 1875); Maurice Guizot, *Les années de retraite de M. Guizot* (ib., 1901); H. P. Thieme, *Guide bibliographique de la littérature de 1850 à 1906* (ib., 1906).

GUJARAT, gōō′jȧ-rät′. A geographical division of India, extending along the northern seaboard of the Province of Bombay. It comprises the Kathiawar Peninsula, and, on the mainland, Baroda (the dominion of the Gaikwar), and includes the native states of Cambay, Cutch, Kathiawar, Mahi Kanthar Polanpur, Rewa, and Surat. It is bounded on the north by Rajputana and on the south by Concan. The Vindhya and Satpura mountains extend into the region from the east. Area, 345,307 square miles; pop., 1911, 4,882,801. The surface generally is level and monotonous. The chief rivers are the Nerbudda and Tapti. The products are cotton, rice, wheat, barley, maize, tobacco, sugar, opium, and fruits. The name "Gujarat" is frequently applied to the country north of the Nerbudda River and east of the Rann of Cutch.

GUJARĀTĪ (gōō′jȧ-rä′tē̇) **LANGUAGE AND LITERATURE.** The language of Gujarat in western India, spoken, according to the census of 1901, by 9,928,501 persons and, by the census of 1911, 10,682,000. It is derived, through the mediæval vernaculars called Prakrit, especially the Saurasēna Apabhramśa, from ancient dialects closely akin to Sanskrit. It contains many words borrowed from Sanskrit, Arabic, and Persian. Its alphabet is a modification of the ancient Devanagari script of the Sanskrit, with the bar above the letters omitted.

Gujarātī literature is abundant and of fair character. It begins with Narsingh Mēta (1413–79), who composed short poems on religious subjects. Other poets of note were Vallabh, Kālidās, Brahmānand, Dayārām, Sāmal Bhatt, and Rēwa Shaṅkar, the translator of the *Mahābhārata*.

Consult: Taylor, *Student's Gujarātī Grammar* (2d ed., Bombay, 1908); Bengali and Merchant, *New Pocket Gujarātī into English Dictionary* (ib., 1899); Blumhardt, *Catalogue of Marathi and Gujarātī Printed Books in the Library of the British Museum* (London, 1892); Tripáthi, *Classical Poets of Gujarat* (Bombay, 1894). For a good account of the Gujarātī language as well as a complete bibliography, consult Grierson, *Linguistic Survey of India*, vol. ix, part ii (Calcutta, 1908), which contains also specimens of both the Rājasthānī and Gujarātī languages.

GULANGANE, gōō′lȧn-gä′nȧ. See DULANGAN.

GULBAR′GA, KULBAR′GA, or **CALBUR′GA.** A town of Hyderabad, India, 110 miles west of Hyderabad by rail (Map: India, C 6). It stands on a minor affluent of the Kistna and has been successively the capital of Hindu and Mohammedan sovereignties. The town's ancient prosperity is reviving, modern buildings, public offices, barracks, a fine bazar, a model jail, and ornamental gardens relieving the archaic aspect of numerous mosques and tombs. The chief feature of interest is the fort containing the citadel and the Jama Masjid, a unique mosque built in the thirteenth century after the design of the great Cordova mosque in Spain. It is the only mosque in India completely roofed over, and it covers an area of 38,016 square feet. Pop., 1901, 29,228; 1911, 34,437.

GULBRANSON, ELLEN (*née* MORGREN) (1863–). A Swedish dramatic soprano, born at Stockholm. In 1880 she entered the conservatory of her native city and after graduation went in 1883 to Marchesi in Paris for further study. She made her début on the concert stage in 1886, on the operatic stage three years later. Her international reputation dates from her great success as Brunhilda at Bayreuth in 1896. Until 1900 she was the principal dramatic soprano of the Royal Opera of Stockholm. Thereafter she was connected with the Berlin Opera. In 1890 she married the Norwegian officer Hans Gulbranson.

GULDBERG, gụld'bĕrg, Ove Höegh (1731–1808), more correctly Höegh-Guldberg. A Danish statesman, theologian, and author, born at Horsens. He became preceptor of Crown Prince Frederick, the son of Christian VII, and managed the coup d'état that overthrew Queen Caroline and Struensee. By this means he became secretary of the cabinet (1773) and Secretary of State (1776). Under his leadership the country gained in importance and power. When the King reached his majority (1784), Guldberg was sent to Aarhus as Governor (1784–1802). He wrote a valuable *Universal History* and some theological works.

GULDEN, gōōl'den. See Florin.

GULES, gūlz (from OF., Fr. *gueules*, red, from OF. *gole, goule*, Fr. *gueule*, throat, from Lat. *gula*, throat). The name for the color red in heraldry (q.v.). It is indicated in engravings by perpendicular lines.

GULF OF CAR'PENTA'RIA. See Carpentaria, Gulf of.

GULFPORT. A city, port of entry, and the county seat of Harrison Co., Miss., 68 miles east of New Orleans, on the Mississippi Sound, and on the Louisville and Nashville and the Gulf and Ship Island railroads (Map: Mississippi, G 10). It has a fine harbor accessible to large vessels, carries on an extensive trade in lumber, naval stores, and cotton, and has railroad repair shops, fertilizer works, cottonseed-oil mills, canning factories, roller, saw, and planing mills, and important truck-farming and fruit-growing interests. Among the features of the city are the United States customhouse, Gulf Coast Military Academy, and post-office building. Gulfport adopted the commission form of government in 1912. The water works are owned by the city. Pop., 1900, 1060; 1910, 6386.

GULF STREAM. The most important and best-known current in the Atlantic Ocean, deriving its name from the Gulf of Mexico, out of which it flows between the coast of Florida on the west and the Bahamas on the east. Its breadth in the narrowest portion is about 50 miles, and its depth about 2000 feet; the velocity averages between 2 and 3 miles per hour, reaching an extreme of 5 or 6 miles in some localities. This great mass of warm water, having a temperature several degrees higher than the neighboring ocean, flows northeastwardly along the American coast, but can no longer be distinguished from the rest of the ocean drift by either temperature, saltness, color, or motion, after it has passed lat. 40° N. and the meridian 60° W. As it passes the thirty-second parallel between the Bermudas and the coast of Carolina it is divided into several small streams of about 100 fathoms deep and aggregating 150 miles wide. North of this region the increasing westerly winds so break up the surface and mix the waters that it is improper to speak of the Gulf Stream as having any further existence, since it becomes the general drift of warm water from the southwestern Atlantic northeastward to Europe, which is a general phenomenon that has little or nothing to do with the special Gulf Stream, properly so called.

By means of floating derelicts, bottles, and buoys, the general drift of the ocean surface currents has been studied with great care. The majority of the derelicts in the Atlantic Ocean circulate around the Sea of Sargasso, but occasionally one penetrates directly through it. Very rarely does a derelict make its way from America to the European coast. Where the western edge of the so-called Gulf Stream passes by and intermingles with the cold northerly drift, close to the coasts of Newfoundland and New England, banks of fog are formed; but these are not the fogs that trouble navigation. The latter are due to the flow of warm southwest winds over the cold ocean water and therefore depend for their existence on the wind rather than on the Gulf Stream. It is a common error to attribute the warmth of Europe, as compared with the cold in America in the same latitude, to the influence of the Gulf Stream; meteorology shows that the southwest winds of Europe, bringing moisture from the ocean, are not appreciably affected by the Gulf Stream. On the other hand, this deep layer of moist southwest wind contains far more latent heat than the same quantity of dry air at the same temperature; and it is the evolution of latent heat by this moist air in the formation of fog, cloud, and rain that raises the temperature of the atmosphere over Europe and prevents loss of heat by radiation. Precisely the same phenomenon is found on the leeward side of each of the Great Lakes, and of the Mediterranean Sea, the Baltic, and probably every other large sheet of water.

The mechanical cause of the Gulf Stream has been clearly expounded by William Ferrel. It is not caused wholly by the winds. The steady northwest trade winds are not strong enough to raise any considerable mass of water in front of them. Hurricane winds may raise the level several feet temporarily, but the trade winds scarcely an inch. The accurate levelings of the Coast and Geodetic Survey have shown that there is no appreciable difference of level between the water in the Gulf of Mexico and that of the Atlantic on the opposite coast of Florida. The Gulf Stream is a result of the general vertical circulation of the ocean, bringing from the north cold water which sinks below, while the warm water of the equatorial region rises and slides northward above the cold current; owing to the rotation of the earth, each of these currents deviates towards the right, so that the cold current presses towards the southwest and the surface current towards the northeast. These pressures are very slight, but by acting for long ages they have given the upper layers of the ocean a slight general rotation. By thus being pushed against the shores or through narrow channels, the mass of water far below the influence of surface winds is forced to seek its channel of easiest flow, and the cold water flowing through certain passages between the West Indian Islands into the Caribbean Sea flows thence into the Gulf of Mexico, and finally it rounds Cape Sable as warm water from the gulf. The Gulf Stream really has its origin in deep currents far east of the Windward and Leeward Islands and is pressed northward beyond Cape Sable by the force of the water pushing behind it from the Atlantic Ocean into and through the Caribbean

Sea. In other parts of the globe there are great ocean currents that depend wholly upon the winds, but this does not seem to be the case with the Gulf Stream.

Bibliography. Ferrel, *Winds of the Globe* (New York, 1895); Agassiz, *Three Cruises of the Blake* (Boston, 1888); Pillsbury, in *Annual Report*, published by the United States Coast Survey (Washington, 1890); Thomson and Blake, *Reports of the Scientific Results of H. M. S. Challenger* (London, 1880–95); C. L. Riker, *The Power and Control of the Gulf Stream* (New York, 1912).

GULF′WEED′. The gulfweeds are well known on account of their connection with the so-called Sargasso Sea. In that great ocean eddy these gulfweeds accumulate in vast quantities, and the impression has been that they have been torn from the coast and swept out to sea. This is probably not true, but they are free floating forms that grow and pass through their whole life history in the floating condition. They are remarkable among algæ for the differentiation of the body into regions which may well be called leaves and branching stems, and they also produce short branches that develop the bladder-like floats which resemble small berries. See Phæophyceæ.

GU′LICK, John Thomas (1832–). An American Congregational missionary and evolutionist, born at Kauai, Hawaiian Islands. He was a miner in California in 1849–50, graduated from Williams College in 1859, and studied at Union Theological Seminary. He served as a missionary at Peking, China, in 1864–65, at Kalgan, China, in 1865–75, and in Japan from 1875 to 1899 under the American Board of Commissioners for Foreign Missions. From 1899 to 1905 he resided at Oberlin, Ohio, and later at Honolulu, Hawaiian Islands. He is author of articles on Darwinian topics in the *Journal of the Linnæan Society* and the *American Journal of Science* and also of *Evolution Racial and Habitudinal* (1905).

GULICK, Luther Halsey (1865–). An American specialist in physical education, born at Honolulu, Hawaiian Islands. After studying at Oberlin Academy and at the Sargent Normal School of Physical Training, he graduated from the Medical Department of New York University in 1889. He was superintendent of the physical training department of the Y. M. C. A. Training School at Springfield, Mass. (1887–1900), principal of the Pratt Institute High School (1900–03), in 1903–08 had charge of the physical training in the public schools of New York City, and from 1908 to 1913 directed the department of child hygiene of the Russell Sage Foundation. He served as president of the American Physical Education Association in 1903–06, of the Public School Physical Training Society in 1905–08, of the Playground Association of America in 1906–09, and of the Camp Fire Girls after 1913. Besides editing *Physical Education* (1891–96), *Association Outlook* (1897–1900), *American Physical Education Review* (1901–03), and the *Gulick Hygiene Series*, he wrote: *Manual of Physical Measurements* (1892); *Physical Education by Muscular Exercise* (1904); *The Efficient Life* (1907); *Mind and Work* (1908); *The Healthful Art of Dancing* (1910); and was coauthor of *Medical Inspection of Schools* (1908, 1913).

GULISTAN, gōō′lē-stän′ (Pers., rose garden). The most famous work of the Persian poet Sadi (q.v.). There are English translations by Eastwick (Hertford, 1852), Gladwin (Boston, 1865), and Sir Edwin Arnold (London, 1899).

GULL (from Corn. *gullan*, Welsh *gwylan*, Bret. *gwelan*, gull). A web-footed bird of the subfamily Larinæ, of the family Laridæ. The gulls are inhabitants of the seacoasts of all parts of the world and also of the shores of large rivers and lakes far inland. The bill is strongly hooked at the tip, thus differing from that of the terns, and lacks a cere, in this respect differing from that of the jägers. The tail is usually square across the tip, and the wings are long and pointed. The plumage is generally in great part white, variously mixed with gray, slate color, brown, and black. The white in some species assumes a rosy tint in the breeding season, and the head of some becomes black. The differences of plumage, according to age, season, and sex, are very considerable and have led to many errors as to species. Gulls have great power of wing and delight in performing varied and beautiful evolutions. They descend with great rapidity to seize prey from the surface of the water or at a small depth; but they are not good divers, and the fishes caught are chiefly those which, like the herring, swim near the surface. They are very voracious. Their food consists of almost anything animal, and they frequently rob other birds' nests of eggs or young. In winter they throng harbors and feed largely on scraps thrown from ships or drifted upon the shores. The larger gulls seize clams and other mollusks, carrying the large ones into the air and dropping them upon a rock in order to break them. The flesh of gulls is rather coarse, but that of the young is in request on many northern coasts as an article of food and is salted for winter use. The eggs are palatable and are collected in great quantities in some places. All gulls are wholly or partially migratory; they breed in colder regions than those which they inhabit in winter. In general, they lay only two or three eggs, which are large for the size of the bird, bluish white to brownish olive in color, more or less heavily spotted, blotched, and marked with brown, black, and purplish. The nest is composed of moss and seaweeds, or marsh weeds, and is usually on the ground in swamps or on rocky cliffs. Occasionally, however, the nest is built in trees and is then based on a foundation of sticks.

About 50 species of gulls are known, of which about 26 are found in North America. The commonest and most widely distributed are the ring-billed gull (*Larus delawarensis*) and the herring gull (*Larus argentatus*). The latter is 2 feet long and nearly 5 feet across the wings, while the former is considerably smaller. Both species are abundant on the Atlantic coast, in the Mississippi valley, and about the Great Lakes. They breed from the United States northward. The kittiwake (*Rissa tridactyla*), rather smaller than the first named, gray and white, and destitute of a hind toe, is plentiful in Arctic America and Europe, where the coast is girt with rocky precipices, on the narrow ledges of which it makes its nest. Its young and eggs are among the chief objects of pursuit of the rock fowlers. The great black-backed gull, or wagel (*Larus marinus*), nearly 30 inches long, is found on the Atlantic coasts of both Europe and America; and the glaucous gull, or burgomaster (*Larus hyperboreus*), scarcely inferior to it in size, of a pale bluish-gray color above and white below, is a winter visitant from the Arctic regions.

On the Pacific coast of North America the common gulls are the glaucous-winged gull (*Larus glaucescens*), the California gull (*Larus californicus*), and the western gull (*Larus occidentalis*), all large birds, 4½ feet across the wings. Smaller than these is the white-headed gull (*Larus heermanni*), which is lead-colored, with a white head and red bill; it is common on the coast of California. Other notable gulls are the common mew (*Larus canus*) of Europe; the red-legged kittiwake (*Rissa brevirostris*) of Bering Sea; the Arctic ivory gull (*Pagophila alba*), the entire plumage of which is pure white; the black-headed gulls of Europe and America (*Larus ridibundus* and *atricilla*); Franklin's and Bonaparte's rosy gulls (*Larus franklini* and *philadelphia*), the white underparts being suffused with rose during the breeding season; Ross's rosy gull (*Rhodostethia rosea*), which has a wedge-shaped tail and is white, rosy tinted, with a black collar, and occurs only in the most northern regions; and the forked-tail gulls (*Xema sabini* and *furcatus*), the former Arctic and common, small, the latter tropical, very rare, and large. Terns, boobies, and various other marine birds are often very improperly called gulls. See Plate of AUK, ALBATROSS, ETC.; KITTIWAKE; MACKEREL GULL.

GULL, LAUGHING. See LAUGHING GULL.

GULL, SIR WILLIAM WITHEY (1816–90). An English physician. He was born in Thorpe-le-Soken, graduated at London University in 1841, and from 1843 to 1865 was a teacher first of natural philosophy, then of physiology and comparative anatomy, and finally of medicine at Guy's Hospital, to which he was also for 20 years physician. From 1847 to 1849 he was a professor at the Royal Institution, and in 1848 became a fellow of the Royal College of Physicians. He was president of the Clinical Society, member of many other associations, and the author of numerous valuable papers on medical subjects.

GUL′LET. See ŒSOPHAGUS.

GUL′LIVER, JOHN PUTNAM (1819–94). An American Congregational clergyman. He was born in Boston, Mass., graduated at Yale in 1840, and at Andover Theological Seminary in 1845, and held pastorates at Norwich, Conn. (1846–65) (where he was active in developing the Norwich Free Academy), Chicago, Ill. (1865–68), and Binghamton, N. Y. (1872–78). From 1868 to 1872 he was president of Knox College (Galesburg, Ill.), and in 1878 was appointed professor of the relations of Christianity and science in the Andover Theological Seminary.

GULLIVER'S TRAVELS, OR TRAVELS INTO SEVERAL REMOTE NATIONS OF THE WORLD. A famous satirical romance by Jonathan Swift, narrating the travels and adventures of Lemuel Gulliver, surgeon, and then captain of several ships. It was first published anonymously in 1726. The plan and form of the romance were influenced by the works of Lucian, Cyrano de Bergerac, and Defoe. It is in four parts, of which the first describes the hero's voyage to Lilliput, the land of pygmies; the second, his adventures in Brobdingnag, among the giants; the third, his journey to Laputa, a country of quacks and pretended scientists; and the fourth his visit to the Houyhnhnms, horses endowed with superior intelligence. The characters and events are in great part satires on prominent personages and political and scientific conditions of the day.

GULLSTRAND, gụl′strând, ALLVAR (1862–). A Swedish optician and physicist, born in Landskrona, the son of a doctor, and educated at Upsala, Vienna, and Stockholm. In the University of Upsala he was professor of ophthalmology in 1894–1913 and then professor of physiological and physical optics. He received honorary degrees from Upsala (1907), Jena (1908), and Dublin (1912), and in 1911 received the Nobel prize for medicine and became a member of the Nobel committee on physics. Among his scientific writings are: *Allgemeine Theorie der monochromatischen Aberrationen* (1900), *Die reele optische Abbildung* (1906), and *Einführung in die Methoden der Dioptrik des Auges des Menschen* (1911). He contributed to H. von Helmholtz's *Handbuch der physiologischen Optik* (1910).

GUL′LY, WILLIAM COURT, first VISCOUNT SELBY (1835–1909). An English parliamentarian, born in London. He graduated from Trinity College, Cambridge, B.A. in 1856, with a first class in the moral sciences tripos, and M.A. in 1859. He was admitted barrister in 1860, Q.C. in 1877, and Bencher of the Inner Temple in 1879. In 1880 and 1885 he unsuccessfully contested Whitehaven and from 1886 to 1905 sat in Parliament for Carlisle. He became Speaker of the House of Commons in 1895, retired in 1905, was created Viscount Selby, and entered the House of Lords. He died at his country seat in Seaford.

GULPER. A fish. See LYOMERI.

GULS HORNEBOOKE, gūlz hôrn′bụk, THE. A tract by Thomas Dekker (1609), giving a vivid account of the manners of Jacobean London. It is largely drawn from Dedekind's *Grobinius*. Consult R. B. McKerrow, *The Gull's Hornbook* (London, 1904).

GÜMBEL, gụm′bel, KARL WILHELM VON (1823–98). A German geologist, born at Dannenfels, Rhine Palatinate. He studied at the universities of Munich and Heidelberg, in 1848 undertook a practical investigation of the mining industry in the government service at St. Ingbert collieries in the Palatinate, and in 1851 was appointed director of the Bavarian geognostic survey. In 1861 he became an honorary professor in the University of Munich, in 1868 an instructor at the Technical High School there, in 1869 was appointed to the Bavarian mining board, and in 1879 director in chief of mines. A fibrous mineral, consisting of a hydrous silicate of alumina, was discovered by him in the clay slate of Northalben (Upper Franconia, Bavaria) and is known to geology as gümbelite; while a petrified corallin is styled *Guembelina.* In 1882 nobility was conferred upon him. His publications include four volumes of the *Geognostische Beschreibung des Königreichs Bayern* (1861–91), an *Anleitung zu wissenschaftlichen Beobachtungen auf Alpenreisen* (1879–82), and a *Geognostische Karte des Königreichs Bayern* (1891).

GUMBINNEN, gụm′bĭn-en. Capital of the district of the same name in the Province of East Prussia, situated on the Pissa, 68 miles east-southeast of Königsberg (Map: Germany, K 1). It produces woolens, linen and cotton goods, leather, machinery, castings, forgings, furniture, bricks, lumber, dairy stuffs, yeast, and spirits. It has a large grain trade and is an important market for cattle. Gumbinnen is of comparatively recent origin, having received in 1722 its municipal rights from Friedrich Wilhelm I, of whom a statue has been raised. Pop., 1900, 14,003; 1910, 14,540, largely descendants of exiled Protestants from Salzburg.

GUM′BO. See Hibiscus.

GUM′BOIL′. An abscess (q.v.) near the root of a tooth and discharging itself towards the mucous membrane of the gum. Gumboils should be treated by a free incision.

GUMBO SOIL. The term "gumbo" (probably of negro origin) is popularly applied in the western United States to a class of very heavy, fine-grained soils (the grains are less than $\frac{1}{100}$ inch in diameter), rich in soluble salts (alkali), and practically devoid of sand. Water percolates through them with difficulty, and as they are soapy and waxy when wet, the names "waxy" and "black waxy" are sometimes applied to them. These soils improve with cultivation, but are difficult to till. See also Soil.

GUM DRAGON. See Dragon's Blood.

GUM FLUX. See Gummosis.

GUMILLA, gōō-mē′lyȧ, José (1690–1758). A Spanish missionary, born at Barcelona. He was a Jesuit and in 1714 was sent to South America, where he was made superior of the missions on the Orinoco (1728). Soon afterward he returned to Spain and was appointed head of the College of Cartagena (1734) and of the University of Madrid (1738). He was a careful student of South American fauna and flora and wrote *El Orinoco ilustrado y defendido* (1745), a very valuable work.

GUM′MA. See Syphilis.

GUMMERE, gŭm′ẽr-ė, Francis Barton (1855–). An American scholar, born at Burlington, N. J. He graduated at Haverford College (Pa.) in 1872, at Harvard in 1875, studied in Germany at the universities of Leipzig, Berlin, Strassburg, and Freiburg, and was appointed professor of English in Haverford College in 1887. He was elected president of the Modern Language Association of America in 1905, and in 1913 was chosen a member of the National Institute of Arts and Letters. In addition to contributions to the *Nation*, the *American Journal of Philology*, and other periodicals, he published a valuable and widely used *Handbook of Poetics* (1885); *Germanic Origins* (1892); *Old English Ballads* (1894); *The Beginnings of Poetry* (1901); *The Popular Ballad* (1907); *The Oldest English Epic* (1909); *Democracy and Poetry* (1911).

GUMMERSBACH, gụm′ẽrs-bäG. Capital of the district of the same name in the Prussian Province of Westphalia, 30 miles northeast of Cologne (Map: Germany, B 3). Its principal industry is the manufacture of cardigan jackets, woolen goods, carpets, smokers' supplies, electrical goods, paper, machinery, and boilers. Near by lie important quarries. Pop., 1900, 12,525; 1910, 16,044.

GUM′MING. See Gummosis.

GUM′MITE. A uranium mineral of doubtful composition, formed by the alteration of uraninite (q.v.). It is quite strongly radioactive.

GUMMO′SIS (from Lat. *gummi*, Gk. κόμμι, *kommi*, gum), Gumming, or Gum Flux. Any plant disease in which gum flows from the diseased area or its vicinity. There are many different diseases of this character, which have been noticed upon many species of plants, as shown below. The gum, according to Sorauer, is a combination of metagummic acid and lime, and its formation results from irregularities in nutrition processes due to the presence of fungi, bacteria, and unfavorable soil conditions. When it first appears, it is soft, translucent, and gelatinous, but becomes hard, horny, and brittle upon standing and very dark brown or nearly black. Fungi and bacteria seem associated with the gummosis of many trees, but they are perhaps secondary to some cause like insufficient nutrition, wounds, etc. Poor soil and superabundant moisture and certain chemical compounds are believed to cause a flow of gum in some plants. On the other hand, there seems abundant evidence that diseases caused by bacteria produce gummosis of grape, olive, sugar beet, sugar cane, etc., and the gummy deposits noticed in the fire blight of pears and bacterial wilt of cucurbits. A common form of gummosis of cherry and other stone fruits is caused by the fungus *Ascospora beyerinckii.* This fungus can live in and kill the leaves and young fruits of these trees. In the Japanese quince (*Pyrus japonica*) the tears of gum accompany the attacks of *Cladosporium epiphyllum.* If broken off, a canker-like wound is revealed, which may extend often to the pith of the stem. In California a gummosis of citrus trees is said to be due to at least five different causes, two of which are fungi, *Pythiacystis citriophora* and *Botrytis vulgaris.* In Florida gumming of citrus trees has been found due to attacks of *Phomopsis citri* and *Diplodia natalensis.* The latter fungus attacks a large number of species of trees, causing gummosis. In the case of many of these diseases pruning below the gum deposits may be of some service in checking the disease. When wet, the gum dissolves and flows to the ground, carrying spores with it. To destroy these a dressing of lime at the base of the tree is recommended. In those forms of gummosis due to errors in cultivation, restoring the necessary functions of the plants should correct the disease. For wounds of insects, etc., coat the wounded surface with tar or some similar material.

GUMPLOWICZ, gōōm-plō′vĭch, Ludwig (1838–1909). An Austrian political scientist and sociologist. He was born at Cracow and studied in that city and in Vienna. In 1882 he was made professor in the University of Graz. His principal works are: *Philosophisches Staatsrecht* (1877); *Verwaltungslehre* (1882); *Der Rassenkampf* (1883; revised and enlarged ed., 1909); *Grundriss der Sociologie* (1885; revised and enlarged ed., 1909); *Das österreichische Staatsrecht* (1891); *Sociologie und Politik* (1892); *Die sociologische Staatsidee* (1892); *Geschichte der Staatstheorien* (1905); *Das allgemeine Staatsrecht* (3d ed., 1907). His works are characterized by profundity of research. *Der Rassenkampf* is generally recognized as one of the most important of recent attempts to give unity to the science of sociology. See Sociology.

GUMRI, gōōm′rė. See Alexandropol.

GUMS. A class of amorphous organic substances mostly of vegetable origin and composed of carbon, hydrogen, and oxygen. Many of them are completely soluble in water, forming with it a transparent mucilage; but they are all insoluble in alcohol. Chemically the gums are complex acids yielding simpler acids and sugars by hydrolysis. The finer varieties are used pharmaceutically for making emulsions and emollients. Other gums are used in the manufacture of confectionery, in calico printing, in making ink, finishing cloth, etc. With reference to their chief constituents the gums may be subdivided into the following three groups: (1) gum arabic and similar gums; (2) gum tragacanth and similar gums; (3) other gums, such as cherry gum, peach gum, etc.

(1) *Gum arabic*, or *gum acacia*, is gathered chiefly from the Acacia Senegal, growing in East Africa, and near the Senegal River in West Africa. It is brought into the market in the form of roundish tears, varying in color from a light straw to a garnet red, and is more or less transparent; the lightest is always the best. *Picked Turkey gum* is the most esteemed variety. Gum arabic consists chiefly of arabin (arabic acid), combined with calcium, magnesium, and potassium. *Barbary*, or *Morocco, gum*, a dark-colored variety, has some qualities which render it valuable to confectioners. *Gum Gedda* is an inferior quality, now but seldom met with in commerce. *Gum Senegal* comes in fine, large, round tears, generally larger and of a darker color than the finest gum arabic. It is found in tropical parts of the western coast of Africa. *Gum gattie*, an Indian gum, is used as a substitute for gum arabic. Other varieties are: *Cape gum*, the Australian *wattle gum*, etc. *Wood-apple gum* is often used as an adulterant of gum arabic. The East Indian gums are dark colored and much inferior to those produced in Africa.

(2) *Gum tragacanth*, or gum dragon (Fr. *gomme adragante;* Ger. *Traganth*), is a gummy exudation from various species of *Astragalus* (natural order Leguminosæ). It is derived chiefly from the *Astragalus gummifer*, growing in western Asia, and comes into the market by way of Smyrna and Constantinople. The best sort is the *flaky tragacanth* of commerce; *vermicelli* and *common tragacanth* are cheaper varieties. Tragacanth is dull, translucent, hornlike, and has a white or yellowish color. It contains both arabin and bassorin; when the gum is treated with water, the portion containing arabin goes into solution, forming a mucilaginous liquid, while the bassorin remains undissolved. Tragacanth has a soothing action when applied to a sore throat. It also finds considerable application in the arts, being much valued as a stiffening material for various textile fabrics. The following gums are more or less closely allied to gum tragacanth: *Bassora gum*, which is used to adulterate tragacanth; *wood gum*, which is derived from the birch, ash, oak, willow, etc.

(3) *Cherry-tree gum* is a colorless or yellow gum used for stiffening hats. It swells with water, forming a slimy paste. It contains a considerable amount of the insoluble substance *cerasin.*

Sugar-beet gum, Irish-moss gum, and a few other gums contain substances which differ somewhat in their properties and reactions from the arabin and bassorin, mentioned above. Sugar-beet gum contains pararabin; Irish-moss gum contains lichenin.

A substance named *animal gum* has been extracted from the salivary and mucous glands. It is a carbohydrate closely resembling the vegetable gums; soluble in water, insoluble in alcohol. Like the vegetable gums, it is transformed into sugar when boiled with dilute acids.

Gum Resins. These are the dried exudations of various plants. The gum resins are mixtures containing one or more gums and one or more resins. When they are rubbed with water, the gum generally dissolves, while the insoluble resin forms an emulsion. Alcohol, on the contrary, dissolves the resin, leaving an insoluble residue of gum. It thus requires both water and alcohol to dissolve a gum resin completely. The group includes: *Ammoniac, asafœtida, galbanum, gamboge, myrrh,* and *scammony,* all of which are included in the United States Pharmacopœia, and are described in special articles under their names. Other gum resins are the following:

Bdellium, which resembles myrrh, and was highly esteemed by the ancients for its medicinal properties. The Indian variety is mentioned in the Bible; the African variety is used by French druggists in making plasters.

Euphorbium, an acrid substance formerly used in medicine; it is derived from the *Euphorbia officinarum*, growing in northwestern Africa.

Sagapenum, formerly used in medicine.

Gum Substitute. *British gum* is made from wheat starch, potato starch, and other feculas, by moistening with nitric acid and heating to 250° C. in order to convert the starch into dextrin. It is employed as a substitute for the real gums, which are more expensive. For some purposes a gum substitute is superior to the real gums. Consult: Karl Dieterich, *Analysis of Resins, Balsams, and Gum-Resins* (New York, 1901); Edmond Rabaté, *L'Industrie des résines* (Paris, 1902); F. S. Hyde, *Solvents, Oils, Gums, Waxes, and Allied Substances* (New York, 1913).

GUMS, Diseases of. Acute inflammation of the gums is termed gingivitis, a condition characterized by swelling, redness, soreness, and a tendency to retract from the teeth. Gingivitis is common in infants during the period of dentition. Scurvy, chronic lead and mercurial poisoning, and the severe forms of infectious diseases are attended by inflammation of the gums. A spongy condition of the gums is seen as a result of decayed or tartar-incrusted teeth or where the care of the teeth is neglected, and in those whose health is impaired from any cause.

Bleeding from the healthy gums is a symptom of the hemorrhagic diathesis. (See Hæmophilia.) In scurvy (q.v.) bleeding occurs when the gums are touched even very gently. They are swollen and purplish from submucous oozing and in advanced cases may become black in color and give the breath a foul odor. After excessive doses of mercury a thin red line appears at the margin of the gums; in chronic lead poisoning a blue line forms immediately below the teeth.

The tumors peculiar to the gums are epulis —a characteristic vascular growth, which sometimes arises as a result of irritation of the teeth, especially the incisors. Epithelioma, papilloma, and polypoid tumors are also observed.

Spongy or ulcerated gums are treated locally by antiseptic astringent mouth washes. Tincture of myrrh, diluted in water, weak solutions of alum, and infusion of cinchona are favorite and valuable remedies. For the soreness of the gums during the teething period small doses of potassium chlorate are beneficial. To prevent the development of gum affections the teeth must be kept clean, decayed teeth filled or extracted, and tartar removed. In gingivitis arising from constitutional causes, a cure will result when the latter are corrected.

Pyorrhea Alveolaris, or Rigg's Disease, is a chronic destructive process involving the pericementum and alveolar tissues, and is not properly a disease of the gums. See Pyorrhea Alveolaris.

GUM THUS. See Naval Stores.

GUMTI, gụm'tē. A river of India, remarkable for its windings. It rises in a small lake in the District of Shahjehanpur in the United Provinces of Agra and Oudh, and after a southeastern course of 482 miles enters the Ganges about 20 miles below Benares. It is navigable for inland craft to Lucknow, more than 300 miles above its confluence with the Ganges.

GUM TREE. A name applied to many very distinct trees that exude gum or resin of some kind. In the United States, one of the best known from New York to Texas is the sweet gum (*Liquidambar styraciflua*, of the family Hamamelidaceæ), sometimes called the American storax, a large, handsome tree, with deeply five to seven lobed smooth and shining leaves, which in autumn become brilliant scarlet. The rather fine-grained wood is used to a considerable extent for furniture, and the bark, which is deeply furrowed, is valued in domestic medicine in the treatment of dysentery. Several species of *Nyssa*, a genus of the family Cornaceæ, are known as gum trees. The best known is the black or sour gum (*Nyssa sylvatica*), found from Maine to Texas, a large tree with tough, close-grained wood which, since it splits with difficulty on account of its cross-grained and interlacing fibres, is valuable for hollow woodenware. Other species are common through the Southern States, where they are better known as tupelo. *Nyssa capitata*, of rather limited range in South Carolina, Georgia, and Florida, is known as the ogeechee lime from the appearance of its edible fruit. *Bursera gummifera*, of Florida, is known as gum elemi, and *Bumelia lanuginosa*, the shittimwood, indigenous from Illinois to Texas and Mexico, is locally known as gum elastic. In Australia the name "gum tree" is applied with various modifications to many of the species of *Eucalyptus* (q.v.). *Styrax benzoin* is called gum tree in the East Indies, and in Europe a number of other trees are similarly designated.

GUN. A heavy piece of artillery or ordnance designed chiefly for direct fire, in which it differs from howitzers and mortars, which use high-angle fire. See Artillery; Guns, Naval; Ordnance; Field Artillery; Machine Gun; Mortar; Siege Gun.

GUN'BOAT'. A small vessel of light draft, designed for service in harbors, rivers, and inshore waters. Modern gunboats are much larger than their prototypes. In the United States navy the vessels of the *Yorktown* class of 1700 tons' displacement are styled gunboats, though their proper designation is that of *cruiser*, for they are seagoing ships. Gunboats have always been useful auxiliaries in offensive and defensive warfare, but by themselves they have very little fighting value. As a measure of supposed economy, President Jefferson inaugurated a gunboat policy during his administration and built a large number of them, as he thought they would be better for defense than the larger ships. They achieved nothing in the War of 1812, and the money spent on them was thrown away.

GUN CAR'RIAGE. The vehicle or support by which artillery or heavy ordnance is brought into action or manœuvred. The modern gun carriage is a result of the great improvements made in recent years, chiefly due to better mechanical design, and the introduction of pneumatic and hydraulic cylinders to check the recoil, combined with powerful springs or compressed air to throw the gun back to its firing position, after recoil. For more detailed information, see Artillery; Field Artillery; Coast Artillery; Guns, Naval; Machine Gun; Mountain Artillery; Siege Gun; Ordnance.

GUN'COT'TON. A name applied to certain cellulose products of the action of nitric acid on cellulose, discovered by Schönbein in 1846. The molecular formula of cellulose (q.v.) is some unknown multiple of $C_6H_{10}O_5$, and the action of nitric acid results in the substitution of a varying number of NO_2 groups for hydrogen atoms in the doubtless complex molecule of cellulose, some 11 different varieties of cellulose nitrates being recognized. The composition and chemical constitution of the resulting compounds determine their properties (e.g., the solubility in organic liquids), and upon these, in turn, depend the practical uses to which the several compounds may be applied. The higher substitution products are generally called guncotton; the lower ones, pyroxylin.

In preparing the cellulose nitrates purified cotton is treated with a mixture of nitric and sulphuric acids. The mixture used in the case of military guncotton consists of one part by weight of nitric acid, specific gravity 1.5, and three parts of sulphuric acid, specific gravity 1.845. For every pound of cotton 12 pounds of the acid mixture are used, and the cotton is immersed and digested in it for 24 hours. After the acid has been removed from the cotton by wringing, the latter is pulped, washed, and compressed into blocks. The acid liquids which have been expelled from the cotton after use are found to contain 79.91 per cent of sulphuric acid, 9.52 per cent of nitric acid, 1.04 per cent of nitrogen tetroxide, and 9.65 per cent of water. This mixture is reworked and is used again. For pyroxylin and other of the lower cellulose nitrates weaker acids are used, according to the purpose for which the resulting product is intended.

Cellulose nitrate for the manufacture of smokeless powder is prepared as follows: The base, in the form of cotton waste or cotton rags, is taken to a washing house, where the waste is put into a washer, which consists of a large iron cylinder mounted on a horizontal axis, with pipes, which carry steam for heating the charge, running through its centre. The cylinder is filled with a solution of caustic soda, the cotton waste is added to this, and the temperature raised to 120°–130° F. and maintained during the four hours of washing. The washer revolves very slowly, so as to keep the mass constantly agitated and scoured in order to remove oil, grease, and foreign bodies. From the washing house the cotton is taken to a centrifugal wringer and wrung as dry as possible. It is returned to the washer and washed a second time in clear pure water and then is wrung out again in the centrifugal wringer.

After the second wringing it is taken to the *picker*, where the cleaned cotton waste, or rags, is placed on the apron of the machine, which conducts it between two horizontal toothed cylinders revolving in opposite directions so as to pull the cotton in between them, thus tearing the knots and tangled lumps of waste apart, or tearing the cotton rags into shredded strips about 1 inch to 1½ inches long and about ¼ inch wide. After passing through the picker it is collected in boxes and taken to the drying house. This house is provided with large wooden bins having perforated bottoms, on which the cotton is placed. Hot air circulates under these bottoms and is forced up through the bins and through the *cleaned, dried,* and *picked* cotton placed therein. The temperature of the air is from 90° to 105° F. The cotton is turned over by hand from time to time. It is kept in the bins about eight hours, when the water content is reduced to 0.5 per cent. As soon as the cotton is thus dried it is placed in air-tight cans, which is necessary, as it absorbs from 1½ to 2 per cent of water by mere exposure to the air. It is then taken in the cans to the *nitrating house.*

The cotton, as now prepared, is nitrated in earthen pots containing the acid mixture, or by placing it in a centrifugal machine so arranged as to allow the acid mixture to be admitted and the spent acids to be withdrawn through suitable pipes with stopcocks. In case the nitration takes place in a centrifugal machine it is conducted as follows: about 16 pounds of the dried cotton are placed in the machine with about 900 pounds of mixed acids, consisting of three parts of 98 per cent sulphuric acid and one part of 95 per cent nitric acid. The mixed acids are drawn from a large tank, called the mixed-acid tank. The spent acids, after "revivifying" by additions of concentrated "fortifying" acids, are let into the mixed-acid tank. The charge is kept in the centrifugal machine about 30 minutes, where, by becoming nitrated, the weight increases about 50 per cent; the 16 pounds of cellulose giving about 24 pounds of nitrocellulose. The degree of nitration in this case is about 12.6 per cent of nitrogen. During the 30 minutes' immersion the charge is turned over and over by iron hooks. After 30 minutes the drain cocks of the machine are opened, the machine is started, and the spent acids are forced out by centrifugal action. The remainder of the process has for its object the removal of the free acids remaining in the nitrated cotton and also such foreign bodies as may have been formed. To do so the nitrated cotton is taken at once from the nitrating machine and immersed or drowned in a large quantity of pure cold water, where it is kept immersed for eight hours, two changes of water being made during this time. From the drowning tanks the cotton is taken to another centrifugal machine, which is started as soon as the charge is placed in it, and while it is revolving cold water is played on the charge from a hose. After about 10 minutes the washing is discontinued, and the machine is then revolved at its highest speed until the charge is wrung as dry as possible. Where this cellulose nitrate is to be used in further manufacture, as, e.g., in making smokeless powder, a quantity, say about 1000 pounds, is allowed to accumulate from the foregoing operations, and this constitutes what is styled a factory "lot," to which a definite number is given under which subsequent purification operations and stability and ballistic tests of the material are recorded.

The purification is carried out in large wooden tanks having steam pipes arranged over the bottom through which steam circulates and keeps the cotton and water at the desired temperature. Pure water is put in the tanks, a "lot" added and kept in the purifying tank for two days, the temperature being maintained at 80° C. The water is renewed three times during this period, and at each renewal the temperature is raised to 100° C. for two hours. The mass is kept agitated by revolving arms set at different angles. In some factories the purification consists of alternate two-hour washings at 80° and 100° C., with renewal of water each time to include five renewals.

From the purifying tanks the nitrated cotton is taken to a centrifugal machine, where it is washed for a few minutes with pure water from a hose. It then goes to the *pulper.* This is the ordinary pulping machine used in paper mills and consists of an oval-shaped vat or tank provided with a horizontal shaft across its narrowest dimension. On one end of this shaft is a drum which has on its outer surface a series of parallel knife-edges. Directly below the drum is a concentric surface, with a second series of knife-edges. The clearance between these edges can be regulated. Pure water circulates slowly through the vat, running in at one point and overflowing at another. A "lot" of the cellulose nitrate from the purifying tank is placed in the pulper, where the drum in revolving pulls the fibre down and forces it between the two series of knife-edges, cutting it finer and finer until the whole mass is a smooth, even, fine pulp, about the consistency of corn meal; this requires about six hours. The contents of the vat are tested for acid from time to time, and sufficient sodium carbonate is added to neutralize any free acid that may be found to have been liberated as the pulping proceeds.

From the pulper the cotton goes to the *poacher.* This is a vat similar to the pulper in form, but it carries no knife-edges, as the horizontal shaft across its narrow part is provided with wooden paddles only. The purpose of the machine is to continue the washing with agitation, with a view to removing all free acid or alkali. Hence the contents are tested for both acid and alkali as the poaching proceeds, and the operation is continued until the lot is shown to be neutral. A chemical stability test is now made, and any further treatment depends on its result.

When completed, the cellulose nitrate is transferred to a large trough filled with pure cold water. An endless belt of coarse cotton cloth circulates through the trough and passes between two rollers at some distance outside of the trough. As the belt moves through the mass of suspended cellulose nitrate, a certain quantity adheres to it and is carried up between the rollers, which squeeze out the surplus water from it, and then to a scraper which detaches the squeezed pulp from the belt and causes it to fall into receptacles placed to receive it on the other side of the rollers. It is now in the form of small thin flakes and contains about 4 per cent of water. This is submitted to careful laboratory tests to determine its purity, uniformity, solubility, and stability.

The pyroxylin used for the manufacture of pyroxylin plastics, such as celluloid, is made by dipping cotton or tissue paper in a mixture of sulphuric acid, 66 parts; nitric acid, 17 parts; and water, 17 parts; 100 pounds of the acid mixture being used for one pound of paper, and the immersion being continued from 20 to 30 minutes at 30° C. The pyroxylin used in this art is of low nitration, containing about 10.18 per cent of nitrogen. The pyroxylin used for collodion and in the making of varnishes contains about 11.11 per cent of nitrogen and is made by the use of stronger acids than those employed in the manufacture of the pyroxylin for plastics.

The perfection of the modern processes for the manufacture of guncotton are due principally to Baron von Lenk, of Austria, and Sir Frederick Abel, of England. Abel's improvement consisted chiefly in the reduction of the guncotton to a pulp by beating it in rag engines, such as are employed in the manufacture of paper pulp. The fibres of cotton consist of hollow hairlike tubes. When immersed in the acid mixture, they become filled with it, just as capillary tubes of any other material would be, and cannot readily be freed from it. But the acid thus retained is capable of exercising further action on the fibres and thus rendering the product unstable. Guncotton has thus frequently undergone spontaneous decomposition in storage. By pulping the long-staple guncotton Abel cut the fibres into very short tubes, which permitted of the acids being readily washed out with water in a poacher and thereby insured the stability of the product. Moreover, the moist pulp can be readily molded into any desirable shape and can be compressed to a density that may fit it best for use in military and naval mining. Thus, the guncotton used for torpedoes in the United States navy is compressed into rectangular blocks, with chamfered corners, 2.9 inches in diameter and 2 inches in height, each block being provided with a hole ½ inch in diameter lying in its vertical axis. Such blocks are obtained by first molding the wet pulp in a molding press under a pressure of 100 pounds to the square inch and then subjecting the molded blocks to a pressure of 6800 pounds to the square inch in a final press. Although one of the most powerful of explosive substances when fired by detonation, this military guncotton can, when damp, be shaped with tools as wood is shaped, and in the preparation of the guncotton charges for use in the heads of the very large torpedo shells fired from the pneumatic guns of the United States steamship *Vesuvius*, these compressed blocks of pulped guncotton were sawed with a fret saw and turned in lathes to shape the mass so as to conform to the particular shape of the heads of the torpedoes.

The stability of guncotton or its permanency during storage is tested by exposing it to an agreed temperature and noting its behavior. This is preferably done by the method devised by Abel, in which the guncotton is placed in a test tube which is partly immersed in the water contained in a water bath, the mouth of the test tube being closed by a cork stopper from which a piece of partly moistened test paper is suspended by means of a platinum wire. When the guncotton begins to decompose, it gives off nitrogen oxides, which are absorbed by the moisture on the test paper and react with the reagents with which the paper is covered to produce a color, and as only the lower half of the paper is moistened, the color first appears as a brown line at the point of demarcation between the wet and dry parts of the paper. In making the test the water in the bath is heated up to the agreed-upon temperature, and maintained at that temperature by means of a temperature regulator. As this Abel test merely records the beginning of liberation of nitrous oxide fumes and can be interfered with by the presence of slight quantities of other substances, other methods of testing have been devised. Among these may be mentioned the Guttmann test, the explosion test, the 135° test, the Vieille test, the Will test, and the Sy test, the last two being regarded as the most satisfactory, since both record the progress of the decomposition of the nitrocellulose from beginning to end. "Stabilizing" the nitrocellulose by the addition of small quantities of calcium or magnesium carbonates to neutralize traces of acid and heating the nitrocellulose with water under a pressure of several atmospheres have been tried with apparent success.

Aside from the use of cellulose nitrates for guncotton for military purposes, for which object the product is finely pulped and compressed and undergoes the highest nitration possible, it is also employed in various important industrial applications. The solubility of pyroxylin in ether alcohol, which was discovered by Dr. Maynard, of Boston, in 1847 or 1848, afforded the liquid since known as collodion (q.v.), which can be used as a substitute for sticking plaster and as a vehicle for medicine. Subsequent applications of the cellulose nitrates have been the coating of photographic plates by collodion, the manufacture of celluloid (q.v.), the pyroxylin varnishes invented by Crane, and the making of artificial silk, artificial leather, and transparent films for photography.

The United States census for 1900 reported 10 establishments in three different States engaged in the manufacture and sale of cellulose nitrates, employing $255,343 of capital, and having 163 employees. There were produced 922,799 pounds of the various cellulose nitrates, having a value of $486,773, and there were consumed 691,115 pounds of cotton and 8,247,668 pounds of mixed acids. In addition there were produced and consumed in other establishments 2,739,834 pounds of cellulose nitrates, making a total product for the year of 3,662,633 pounds of cellulose nitrates.

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GUN'DAMUK'. See Gandamak.

GUNDUK'. See Gandak.

GUN'DULF. The reputed founder of an heretical sect in Artois, the bishopric of Liége, and elsewhere in the eleventh century. Of Gundulf himself nothing is known. In 1025 a company of his fellows was arrested by Gerhard, Bishop of Cambrai and Arras, and brought to trial. According to the rules which they avowed, they had forsaken the world, were striving to keep the flesh in subjection, to support themselves by their industry, to be honest in their dealings, and to love all who were willing to join them. In their assemblies they were accustomed to pray and to wash one another's feet. Gerhard, however, charged them with rejecting the sacraments, the Roman Catholic church, marriage, and the sanctity of churches, and forced them to recant. The acts of the synod are the only source from which knowledge of this sect can be obtained, and after the trial neither Gundulf nor his followers can be traced. The acts are best edited by Federicq, *Corpus Documentorum Inquisitionis Neerlandicæ* (Ghent, 1889). Consult Döllinger, *Beiträge zur Sektengeschichte des Mittelalters* (Munich, 1890).

GUNDULIČ, gụn′dōō-lētch, IVO FRANE (1588–1638). The most celebrated Illyrian (Croatian) poet of earlier times. He was born in Ragusa, on the coast of Dalmatia, a meeting place of Italian and South Slavic culture, and received the best education obtainable at the time, studying philosophy, jurisprudence, and classical literature. His scholarly attainments secured him various official posts at an early age, and at one time he occupied the highest office, that of Rector of the Republic of Ragusa. A translation of Tasso's *Jerusalem Delivered* was followed by original poetical works, lyric, epic, and dramatic. His greatest work is the heroic epic *Osman*, in 20 cantos, describing the campaign between the Poles and the Turks around Khotin in 1621. The poem was first published in 1826 and since then has been often republished. An edition for schools, with a commentary, is by Broz (Agram, 1887). Other works of Gundulič are the elegy *Tears of the Lost Son*, and the dramas *Cleopatra, Dubravka, Proserpina,* and *Ariadne*, to mention only a few of the many that laid the foundation of Slavic drama at the new theatre of Ragusa. His collected works were published in 1877 by the Agram Academy in vol. ix of *Ancient Croatian Writings.* Consult: Appendini, *Vita di G. Gondola* (Gundulič) (Ragusa, 1828); Jansen, *Gundulič* (Göteborg, 1900); Makowej, "Beiträge zu den Quellen des 'Osman,'" in *Archiv für slavische Philologie*, vol. xxvi (Brunswick, 1904).

GUNGL, gụn′g'l, JOSEPH (1810–89). An Hungarian composer and conductor, born at Zsámbék in Hungary. He became an oboist in, and subsequently bandmaster of, the Fourth Austrian Artillery Regiment. Previously he had gained considerable experience as a teacher, but it was his work with this organization, both as soloist and conductor, that gained for him public recognition. During the eight years of his leadership the band attained a European reputation and made many tours, Gungl's compositions being the most popular features of the programmes presented. His Berlin Orchestra was established in 1843, with which organization he made a tour of the United States six years later. His other positions were royal musical director (1850) and bandmaster of the Twenty-third Regiment of Infantry, stationed at Brünn (1858). From this time on, most of his life was employed in concert tours. He has left about 400 compositions, for the most part waltzes, many of which have vied in popularity and effectiveness with the waltzes of Strauss. He died at Weimar.

GUNKEL, gụn′kel (JOHANN FRIEDRICH), HERMANN (1862–). A German biblical scholar, born at Springe, near Hanover. He studied theology at Göttingen, Giessen, and Leipzig, was lecturer at Halle in 1889–94, became professor at Berlin in 1894, and in 1907 succeeded his former teacher Stade as professor of Old Testament exegesis at Giessen. His work was particularly important in the field of apocalyptic literature, where he tried to show the presence of Babylonian influence. Among his published works are: *Wirkungen des heiligen Geistes* (1888; 3d ed., 1910); *Schöpfung und Chaos in Urzeit und Endzeit* (1895), a bold criticism of previous commentators on the Book of Revelation, his own theory basing the book on Semitic and especially Babylonian cosmogonies; *Der Prophet Esra* (1900); *Kommentar zur Genesis* (1901; 3d ed., 1911); *Die Sagen der Genesis* (1901; in English, 1901; in Japanese, 1903); *Israel und Babylonien* (1903; in English, 1904), a reply to Delitzsch; *Zum religionsgeschichtlichen Verständnis des Neuen Testaments* (1903; 2d ed., 1910); *Die Religionsgeschichte und die alttestamentliche Wissenschaft* (1910; and in English); *Die Urgeschichte und die Patriarchen* (1911). With Bousset he edited (1903 et seq.) *Forschungen zur Religion und Litteratur des Neuen Testaments.*

GUNMAKING, GUN FACTORIES. See ORDNANCE; SMALL ARMS; SHOTGUN.

GUN METAL, or **GUN BRONZE.** See ALLOY.

GUN′NEL, or BUTTERFISH. A kind of blenny (*Pholis gunnellus*) with a common name contracted from "gunwale fish," which has an eel-shaped body 6 or 8 inches long, and occurs abundantly along rocky shores, among algæ, on both sides of the north Atlantic south to Long Island Sound and on the coast of France. It is deep olive in color, with a row of dark spots on the back, and is remarkable for the quantity and thickness of the mucous secretion with which it is covered. There are other species, all shore fishes of the northern seas.

GUN′NER. In military usage throughout the world soldiers of the various branches of the artillery service are described as gunners. In the United States army the cannoneers are the noncommissioned officers and men who ride on the fieldpiece and limber and who work the guns. The senior of these, a corporal, is called the gunner. He commands the gun squad and lays the piece. The grade of first or second class gunner in both field and coast artillery is open to noncommissioned officers and men who qualify by examination. Master gunners are noncommissioned staff officers of the Coast Artillery Corps and are graduated at the school of this name at Fort Monroe, Va. The grade carries with it an increased rate of pay, the soldier being distinguished by a decoration in the form of a projectile of scarlet cloth inclosed in a yellow wreath with a white star above, worn on the sleeve of his coat. (See MILITARY INSIGNIA.) In the British army there is a warrant rank in the garrison artillery known as master gunner, but it is gradually becoming obsolete.

In the United States a naval gunner is a warrant officer. On battleships and large cruisers there are two—the ordnance gunner, who has charge of ordnance material and supplies; and the electrical gunner, who has charge of electric equipment. Both are assistants to the ordnance officer of the ship, who has charge of and is responsible for all ordnance and electrical equipment except such fittings as are assigned to the care of divisional officers. Gunners are appointed from the enlisted men of the service. Examinations are usually held once a year, the appointments being made from those who pass the best examinations. After six years' service as such, gunners may be promoted, if found qualified upon examination, to the grade of chief gunner, in which they are commissioned with the rank of ensign. Any warrant officer may, if recommended by his commanding officers, take the examination for commission as ensign in the regular line of promotion. Not more than 12 in any one year are so commissioned. In 1914 there were 96 chief gunners and 80 gunners on the active list of the navy. The pay of gunners is the same as that of boatswains and other warrant officers. The pay of chief gunner is the same as an ensign's.

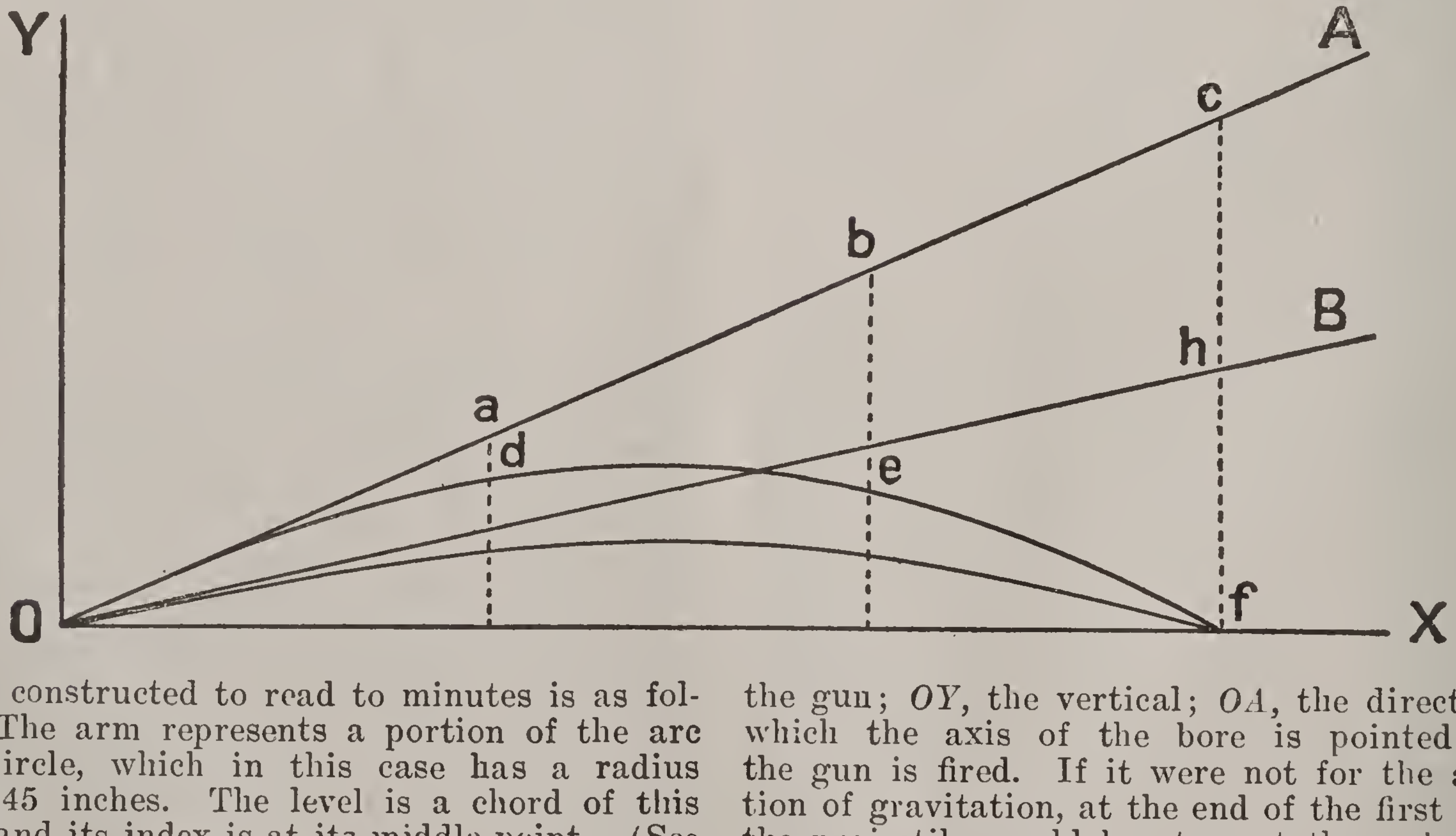
GUNNER'S QUADRANT. A mechanical instrument used in the artillery service, either to give the elevation directly or to verify the angles obtained by ordinary sights on every kind of gun and mortar. In the old-model 3.6-inch, 7-inch, and 12-inch mortars, two seats for the feet of the quadrant were squared off on the upper side of the piece in rear of the trunnions. The quadrant was applied to the breech of the gun, to the face of the muzzle, to an element of the bore, or to an element of the exterior surface where it is parallel to the axis of the bore, as was most convenient. It is composed of two main parts—the body carrying the graduated arc, and the movable arm carrying the index and the level. The movable arm also carries a graduation from 0 to 60; and the level, which is set for minutes and is capable of a longitudinal movement along the arm, carries an index for reading this scale. Degrees are read upon the graduated arm upon the body, minutes by the sliding level and scale on the movable arm. The principle by which the scale of this arm is constructed to read to minutes is as follows: The arm represents a portion of the arc of a circle, which in this case has a radius of 113.45 inches. The level is a chord of this circle, and its index is at its middle point. (See GUNNERY.) The 3.6-inch and 7-inch mortars are no longer manufactured. The new 3.8-inch, 4.7-inch, and 6-inch field howitzers, designed to replace the mortars, are provided with sights which include the principle of the quadrant, so that the gunner's quadrant is now used only to test the sights.

GUN'NERY. The science and art of handling guns. The science of handling guns consists of gun strategy and tactics, exterior and interior ballistics (q.v.), and a discussion of the problems arising under these heads. The art of gunnery consists of drill, target practice, ship and fire control, and allied problems.

Gun strategy and tactics involve a study of the means of gaining advantage by methods of mounting, placing, or grouping guns, direction in which it is desirable to bring the enemy as regards the sun, sea, land, arc of fire, range, etc.; in fact, a study of all means of making the most of one's own weapons and minimizing the effect of those belonging to the enemy. They are constantly changing with the development of naval and military *matériel* which extends, restricts, or gives a new direction to them. As in other fields, the strategy of the gun comprises a study of what to do and gun tactics a study of how to do it, but the dividing line between the two is often so difficult to draw that for all ordinary purposes they are grouped together.

Gun strategy and tactics exert a dominant effect upon the design of vessels and upon naval and military tactics and strategy and are in turn greatly modified by these. For instance, the guiding principle of gun strategy which requires the greatest possible concentration of gun fire led to the development of the dreadnought type of battleship and the widest possible arc of fire of guns, while the increased speed, coal capacity, radius of action, number and power of guns have greatly changed the methods of combining and adjusting forces and of approaching and engaging the enemy.

The art of handling guns is not more simple than the science. As a preliminary to considering it, let us examine the path of a projectile which strikes the ground (or water) at the end of three seconds. In the accompanying figure let the line OX be the horizontal plane through the gun; OY, the vertical; OA, the direction in which the axis of the bore is pointed when the gun is fired. If it were not for the attraction of gravitation, at the end of the first second the projectile would be at a, at the end of two seconds at b, and at the end of three seconds at c. But the action of gravity causes it to drop so that it is at d, e, and f at the end of one, two, and three seconds—the distances ad, be, and cf being determined by the formula for falling bodies, $s = \frac{1}{2}gt^2$, in which s is the distance the body falls in t seconds and g is the accelera-



tion due to gravity, or 32.2 feet. If the velocity were nearly doubled so that the projectile would reach f in $1\frac{1}{2}$ seconds, the height hf would be 36.2 feet, whereas cf is 144.9 feet. This shows the great flattening of the trajectory due to increasing the velocity.

The effect of air upon the projectile is greatly to reduce its velocity. The amount of the reduction depends upon the initial velocity, the density of the air, shape of the projectile, weight of the projectile in proportion to its cross section, etc.

To render a gun effective, four points must be considered: (1) safety, (2) accuracy, (3) destructive effect, (4) speed of fire. Safety is necessary, because the knowledge, or even the suspicion, of unsafeness will demoralize the men who handle a gun; furthermore, the gun may cause much injury in bursting, while the loss of a gun at a critical point in an engagement may lose the fight. In modern guns the greatest dangers to be feared are the premature explosion of the charge; a hangfire (q.v.) and the opening of the breech before the explosion of the charge; the jamming or explosion of a projectile in the bore; the use of bad or unsuitable powder or of proper powder in too great quantities; and weakness in the mount. There is nothing else that should cause a well-made modern gun to give way. Premature explosion of the charge cannot absolutely be prevented. It is usually due to flareback, premature firing of the primer, fragments of burning material in the bore, sparks from electric-power switches or from some slight fire in the vicinity, or the high temperature of a gun heated by rapid firing. Flarebacks are caused by very hot and incompletely oxidized gases remaining in the bore of the gun, which are suddenly further oxidized (developing flame) when the breech is opened and air admitted to the bore. This danger caused many fatal accidents a few years ago, but is now entirely overcome by admitting to the bore a considerable volume of air at high pressure before the breech is opened. This forces the heated air out at the muzzle where it can do no harm. Hangfires are prevented by a locking device which prevents the gun being readily opened if the primer mechanism has been operated and the charge has not exploded, and thus gives instant warning of the failure of the primer or a hangfire. The primer is first examined. If it did not explode or there is some doubt as to its effectiveness, another primer is inserted and the gun tried again. If it fails a second time, the hangfire is established. After a suitable interval, depending upon the size of the gun and previous experience, the breech is opened and the gun reloaded. Hangfires of several minutes' duration have occurred. The principal cause of hangfire is the placing of the charge too far forward from the face of the breech plug, but it may be brought about by several other means. The jamming or explosion of a projectile in a gun sometimes occurs, but either accident is so rare as not to be seriously apprehended. Poorly made powders and powders which do not receive proper care in handling, inspection, and stowage have caused a considerable number of accidents; but with the improvement in the manufacture of smokeless powders and the great care they now receive, such occurrences are becoming less and less frequent. Weakness in the mount is not usually dangerous to the gun's crew, but may disable the gun. It is brought about by an attempt to save weight, as unnecessary weight is undesirable in field, siege, and ship guns.

Having secured a gun which is safe, we should next consider accuracy. In a field gun the causes of inaccuracy are: (1) variations in the angle of sight; (2) drift (due to rotation of the projectile); (3) wind; (4) jump; (5) axis of trunnions not in a horizontal plane; (6) variations in the velocity of the projectile, due to inequality of the powder; (7) incorrect setting of the sights, due to error in supposed distance of the objective; (8) personal errors of the gun pointer; (9) state of the atmosphere (height of barometer and thermometer, heat waves, and hygrometric conditions); (10) effect of strong or defective light upon the sight or upon the objective, etc. In addition to these, guns on board ship are subject to errors due to (11) horizontal movement of the ship and enemy, including changes of speed and course; and (12) rolling and pitching of the ship. As ships' guns have all the causes of error pertaining to field guns and some very important ones of their own, we need consider them only. The angle of sight is the elevation of the objective above the horizontal plane; the error due to this is trifling. This follows from the principle of the "rigidity of the trajectory," which may be briefly explained by saying that the range of a gun upon any plane passing through the axis of its trunnions is practically the same if the angle of elevation above this plane remains unchanged, provided always that the angle between the inclined plane and the horizontal is a small one. The drift of an elongated projectile from a rifled gun is considerable, but is very regular in amount, so that it may be corrected quite perfectly by inclining the rear-sight bar 2° to 3° to the left or dropping the left end of the axis of the telescope sight until it is inclined a similar amount. The exact inclination is determined on the proving ground before the gun is placed in service.

The correction for the force of the wind, incorrect range, jump, variations of velocity due to powder, and state of the atmosphere are made by the officer or officers controlling the firing upon information furnished by the spotter, who is provided with binoculars of high power and watches the fall of the shots from an elevated station. The spotter reports the estimated error "short" or "over" or to the right or left. The personal errors of the gun pointers are corrected as far as possible by instructions, drill with the "dotter" or similar apparatus, and subcalibre practice. The variations in range due to movements of the firing ship are determined by change of range indicators, plotting on paper in the central fire-control station, and direct observation by range finders. When ships roll, the pointer endeavors to keep his sights on the target. In the case of big guns this is not always possible except near the end of the roll. Medium and small calibre guns should have no difficulty in keeping on the target (enemy or target screen), except when rolling very deeply. Bad light on the target cannot always be avoided, but, whenever practicable, ships should manœuvre to attain the best position in this respect.

The destructive effect of projectiles depends upon the character of the shell and of the ship it strikes. Before the development of satisfactory high-explosive charges there were two or three kinds of projectiles for all guns. The armor-piercing shell contained no bursting charge, because its walls were so thick that gunpowder would not burst it and no other form of explosive had been developed which the shock of impact would not explode before the armor was pierced. Suitable explosives have now been developed so that the use of common shell with thin walls and large bursting charges is now greatly reduced, especially in the larger calibres of guns. (See PROJECTILES; ARMOR PLATE.) The destructive effect of one large shell is equal to that of many small ones. This is one of the many reasons which have led to the recent increase in calibres of guns and to the dreadnought type of ship. See GUNS, NAVAL; SHIP, ARMORED; PROJECTILES.

The last point to consider about a gun is speed of fire. Speed is last to be considered, not because it is least important, but because a gun must be safe and its fire accurate and destructive or speed is useless. A high rate of accurate fire can only be obtained by a properly designed mount and breech mechanism, adequate ammunition supply, a reasonably steady gun platform, a well-trained crew, and quick and accurate information as to ranges, objects of attack, corrections for speed of ship and enemy, etc. In addition, the mount must be strong, and all parts must work easily and quickly. Guns must be so placed as to give sufficient working space for the crew and not to interfere with the fire of others.

The present methods of operating guns in battle and target practice differ greatly from those in use a few years ago and still more greatly from the methods of the more distant past. The modern efficiency ideas received some of their earliest development in the navy. The first improvement was subcalibre target practice. The subcalibre piece is a small gun securely clamped to a very much larger one so that the sights of the large one are used to direct the fire of the smaller. For guns of 8-inch calibre and above, the subcalibre pieces are usually 1-pounder guns; for guns of less than 8-inch calibre, small-arm rifles are fitted for subcalibre.

The gun pointer trains and elevates the larger weapon, using its own sights; but when he presses the button for firing, the subcalibre piece only is discharged. The subcalibre gun is clamped so firmly to the other that the axes of both pieces are always parallel. To allow for differences of range between the two pieces, a correction is applied to the reading of the sights. Thus, if the target is 1000 yards away, the sights would read perhaps 1500, as the small piece requires a greater elevation than the large one to attain the same range. These corrections are ascertained in advance and given to the sight setter in the form of a table. The sights attached to the subcalibre gun are not used.

The subcalibre principle has been carried still further for purposes of training. Very small rifles (22-calibre, short) are attached to the guns and a moving target on a reduced scale suspended just beyond the muzzle. The size of the target represents the size that the larger one would appear to be at the practice range. It is therefore very small. To hit it requires approximately the same care and accuracy as to hit the regular target at the target-practice range.

Other means of training are sighting tubes, recording targets, dotters, etc., in which mechanism is employed to record the direction of aim when the pointer thinks he is on the target. By this means the pointer soon learns the character and magnitude of his error and how closely and evenly he must hold the cross wires of the sight on the centre of the target. He is then prepared to begin subcalibre firing. After a certain amount of practice with that he is fitted to fire at regular target practice.

The training of the individual is only a preliminary step in gunnery. The next is fire control. One or more officers are assigned to this duty. The chief fire-control officer directs the fire in accordance with the general orders of the captain. The battery is divided into several parts, and to each part is assigned a spotter, whose duty is to watch the fall of projectiles from the guns under his direction and increase or decrease the range or deflection to the right or left. Range finders are used for the beginning of an action until the fall of shots can be observed and for ascertaining the distance of the enemy for the purpose of determining his speed and course; but the fall of the projectiles is a better guide to the firing, as it takes cognizance of all errors and, as far as practicable, eliminates them. How satisfactorily the rather complicated control systems will work in a very hotly fought action must be left for actual war to decide. At present we can only devise the best apparent methods and provide alternative simpler but less certain means when the first gives way from injury to the communications or from other causes incident to battle.

The ranges at which modern large-calibre guns have been made effective have rendered the employment of smaller weapons nearly futile. Except under special conditions the smaller guns are not even manned, being reserved almost wholly to repel torpedo attack. Torpedo boats of the size in use 10 to 20 years ago are now obsolete and have been replaced by the so-called torpedo-boat destroyer, and even that is five times the size of the early designs. The magnitude and resisting powers of these boats are such that the small guns of the old antitorpedo-boat battery are no longer sufficient to hold them in check, and the modern battery of this sort consists of 4-inch to 6-inch guns.

Not the least of the advantages of the modern battleship of the dreadnought type is that its battle guns are all of one calibre, with the same range, setting of sight, etc. The fire control is therefore greatly simplified. This means less confusion of spotting and greater speed and certainty of fire. The other great advantage is concentration of power. Four ships of the U. S. S. *Pennsylvania* class would form a column about 1700 yards long, and they would carry 48 14-inch guns. Twelve ships of the U. S. S. *Connecticut* class carry 48 12-inch guns, but they would form a column 5700 yards long. The superior speed, defensive power, and arrangement of battery would enable the Pennsylvanias to concentrate on one end of the *Connecticut's* line and crush it, even if the heavy guns were of the same calibre.

The placing of the ship in a position relative to that of the enemy so that it has all the advantages that its design and the condition of the sea and weather render possible, while minimizing as far as practicable those points for the enemy, constitutes ship control and battle strategy. If divisions, squadrons, or fleets are engaged, then simple ship control consists in keeping the ship in position and taking advantage of every opportunity offered by the tactics of the division, squadron, or fleet commander. The advantages to be sought are concentration of fire against a weaker possible fire of the enemy; moving so that the sun, smoke, and sea (causing rolling) affect one's own fire less than that of the enemy. To gain all these is not usually practicable, but they are to be sought if attainable without sacrifice.

The accuracy of modern heavy guns at long distances has greatly increased the probable battle range until now 16,000 to 18,000 yards is regarded as a practicable firing distance, especially when approaching the enemy. Another reason for longer battle ranges is the improvement in torpedoes. Some of the new designs call for a range of 6000 to 10,000 yards. The side which is weakest in number and range of torpedoes will be likely to avoid, if possible, ranges and positions in which they can be used by the other with much prospect of success.

Bibliography. Consult Glennon, *Accuracy and Probability of Fire* (Baltimore, 1888); id., *Interior Ballistics* (ib., 1894); Fullam and Hart, *Text-Book of Ordnance and Gunnery* (Annapolis, 1905); U. S. Naval Academy, *Text-Book of Ordnance and Gunnery* (ib., 1910); Bruff, *Text-Book of Ordnance and Gunnery* (New York, 1896); Alger, *Exterior Ballistics* (Baltimore, 1904); id., *Elastic Strength of Guns* (Annapolis, 1905); *Proceedings of U. S. Naval Institute* (ib., current); *Journal of the U. S. Artillery* (Fort Monroe, Va., current); *Annual Reports of the Office of Naval Intelligence*, particularly that for 1899 (Washington). See Ballistics; Explosives; Field Artillery; Guns, Naval; Gunpowder; Ordnance; Projectiles; etc.

GUN'NY (Hind. *ganni*, Beng. *gōna*, *gōnī*, from Skt. *gōni*, sack, probably originally hide, cf. Prak. *gōṇa*, ox; connected with Skt. *gāu*, Gk. *βούς*, *bous*, ox, Eng. *cow*). A coarse kind of cloth or sacking, manufactured in India, chiefly in Bengal, whence it is largely exported to other parts of the world. The fibre of which the cloth is made is chiefly that of the same species of *corchorus* which yields the jute (q.v.) of commerce, although it is made in Bombay and Madras to some extent from sunn hemp (*Crotalaria juncea*). Enormous quantities are annually exported to China, Australia, and other countries. It is partly made up into bags in Bengal, partly exported as gunny *chuts* or *chuttees*, pieces of size suitable for being immediately made up into bags. The manufacture of these bags was at one time the great domestic industry of all the populous eastern districts of lower Bengal, pervading all classes, and giving occupation to men, women, and children. At present, however, the bags are chiefly made in large steam factories. Gunny, both cloth and bags, is also manufactured in large quantities in Dundee, Scotland. (See Jute.) There are few articles of commerce so widely diffused over the globe as the Indian gunny bag, as it is used for a covering for large packages of all kinds, including cotton bales, and bags for holding wheat, pepper, rice, coffee, and many other kinds of produce. In 1914 the United States imported 14,515,022 square yards of bagging, gunny cloth, and similar fabrics suitable for covering cotton, valued at $996,601.

GUN PENDULUM. See Ballistics.

GUN'POW'DER. An explosive mixture, consisting of potassium nitrate, sulphur, and charcoal, used for military purposes, in firearms, and for blasting. For use with cannon and small arms and for high-grade sporting rifles and shotguns it is being rapidly superseded by smokeless powder (q.v.). There are, however, several important uses to which it is now put, the extent of which may be appreciated when it is stated that in 1909 the production of black gunpowder in the United States was valued at $1,736,427. It is employed as a priming charge in firing smokeless powder and must be used in the older types of rifles and shotguns still owned throughout the United States. It is also necessary in the manufacture of fuses and fireworks and is much used for saluting, as it is far less expensive and is quite as satisfactory for the purpose as the more modern smokeless powders.

The origin of gunpowder is involved in considerable uncertainty, but it is believed that the mixture and its characteristic properties have long been known, even before its use to propel a projectile from some form of artillery. There is evidence that the recipe for making gunpowder was in the hands of some of the alchemists of the thirteenth century, and, on the strength of passages in the works of Roger Bacon, he is often spoken of as its inventor. In his *De Secretis Operibus Artis et Naturæ et de Nullitate Magiæ* (1270) he gives the following directions for making gunpowder: "Mix together saltpetre with lura nop cum ubre and sulphur, and you will make thunder and lightning, if you know the mode of mixing." The mysterious "lura nop cum ubre," after the fashion of the time, was merely a transposition of the letters of the words *carbonum pulver*, or charcoal. The discovery of gunpowder is also assigned to Berthold Schwartz, by whom it was mentioned in 1328. In addition to these references there are other quotations from mediæval writers bearing more or less on the subject, and also numberless traditions which confer on the ancients, and more especially the Eastern nations, the honor of this important discovery. Such legends go back even to the time of Alexander the Great, and it was asserted that he refused to attack the Oxydracæ, a race which occupied the country between the Hyphasis and the Ganges, because they "lived under the protection of the gods and overthrew their enemies with thunder and lightning which they shot forth from their walls." This would seem to corroborate the theory that gunpowder was well known in China many centuries before its first appearance in Europe, and that it gradually worked its way westward.

Passing now to the realm of fact, we know that by the time of the battle of Crécy (1346) cannons in which gunpowder was used as the propellant were well known, and from that time as firearms were developed the amount of gunpowder consumed increased. Although its use rapidly extended, nevertheless its improvement then and since took place at a very slow rate. Gunpowder was at one time very generally styled "meal powder" on account of its fineness of grain and the intimate mixture of its ingredients. Even in the early days of its use it was divided into different qualities, and one William

Bourne, writing on gunpowder in 1587, makes a distinction between *serpentine* and *corne powder*, the latter being the form known to-day. Serpentine powder, according to Sir Henry Manwaring (*Seaman's Dictionary*, 1644), was never used at sea. He says that the cannon powder of that date was not very strong, while the musket powder was the finest, strongest, and best that could be procured. William Bourne, to whose work reference has already been made, speaks of a gunpowder commonly made by the "Bours in Germanie," which was very irregular in its quality, and had to be judged by its taste, color, and the rapidity with which it burned, the amount necessary for a charge being gauged by such a test. He advocates the use of a *cartridge* for the larger guns on shipboard in order to prevent the frequent explosions due to scattered powder. The difficulty of obtaining powder of an even quality persisted until the middle of the nineteenth century, and while the numerous wars made its manufacture necessary on a large scale, yet it was not until the end of the eighteenth century that any substantial improvements in apparatus or machinery were effected.

Gunpowder was made even before the Revolutionary War in the United States with crude machinery which consisted mainly of stamp mills having mortars and pestles of wood and bronze, in which the materials were reduced to powder and thoroughly mixed. The powder thus obtained was coarse and uneven, and the manufacture was attended with great danger. In the eighteenth century the French government gunpowder, which was prepared under the direction of the famous chemist Lavoisier, attained considerable reputation for high quality, and it was in France that the practice of pulverizing and mixing the separate materials in wheel mills was first employed. This method was invented by Cossigny in 1787, and in 1791 a revolving drum was first used for pulverizing, and the wheel mill reserved for mixing and incorporating materials. Improved methods and apparatus were brought to the United States by Dupont, a student of Lavoisier, and the famous works bearing his name at Wilmington, Del., were founded in 1802. In 1856 these works undertook the manufacture of blasting powder, substituting the nitrate of sodium for that of potassium, and in 1868 the method previously suggested by Longchamps, Anthon, and Kuhlmann, of obtaining the potassium nitrate from sodium nitrate and potassium chloride, was adopted. About 1860 General Rodman of the United States army determined to make powder of larger-sized grains, which consequently was slower burning and enabled the Ordnance Department to construct guns of larger calibre. From this discovery resulted powders of variously shaped grains, generally symmetrical, and with perforations. By changing the nature of the carbon constituent, increasing the density through the pressure used in forming the grains, and using brown charcoal as described below, the gunpowder was rendered still slower burning, and in that form, more or less improved, has been brought down to the present.

Manufacture. In the manufacture of gunpowder great care is necessary, especially in the selection of the ingredients. The potassium nitrate, or nitre, as obtained commercially, contains potassium and sodium chlorides and sulphates, sand, and organic matter amounting to nearly 5 per cent. To remove these impurities the potassium nitrate is dissolved in hot water, and after boiling the solution is filtered through bags of coarse cloth into crystallizing vessels, where it is continually agitated while cooling, so that fine crystals may be formed. The crystals are then washed in distilled water and while still moist are stored in bins for use. For the making of the charcoal small wood of about 10 years' growth is preferred. Alder and willow are mostly used in the United States and Great Britain, while in France dogwood is preferred, and in Germany the willow, alder, and dogwood are employed. The wood should be straight, perfectly sound, entirely free from bark, and felled during the spring of the year when its moisture is at its maximum. The carbonization is accomplished in cast-iron retorts set in bricks, and the time of burning varies from three to five hours, according to the nature of the powder for which the charcoal is desired, and at a sufficiently high temperature to drive off all volatile matter.

After cooling, the charcoal is carefully hand-picked and then ground to powder in a mill. The sulphur employed is usually the best commercial article, but this still contains from 4 to 6 per cent of gangue. The sulphur is purified by distillation in a large iron retort, and the sublimed sulphur received in a condenser, from which it is removed in the liquid form and cast in moist wooden molds. When thoroughly cold, the sulphur is broken up into large lumps and finely ground to powder. The ground ingredients are carefully weighed, and the proper proportions mixed in a cylindrical drum of gun metal or copper in charges of 50 pounds and upward. The mixture is then hand-sifted to remove foreign substances, and again mixed in an incorporating mill, in which, by means of distilled water, the charge is kept sufficiently moist to prevent its scattering as dust. This operation is continued for several hours, and the mill cake is then reduced to meal by passing through rollers. The meal is then pressed into cakes by a hydraulic press, and the resulting press cake broken into pieces of different sizes, according to the variety of powder which it is desired to produce. A series of rollers next converts the press cake into grains, which are rough and porous on the surface and very angular in shape. It is freed from dust by placing it in revolving reels and then glazed by causing the grains to rub against each other in revolving wooden barrels. The final operation, called *drying*, consists in heating the glazed powder in large chambers at a temperature of from 52° to 54° C. (126° to 129° F.) for 24 hours. "Pebble," "prismatic," and similar names were given to forms of military powders that were used especially for artillery and were made essentially as just described, except that the press cake was cut into the shapes indicated by their names. (See Explosives.) The black powder once used for military purposes by the United States, Great Britain, Russia, Sweden, Italy, and France, consists of potassium nitrate 75 parts, charcoal 15 parts, and sulphur 10 parts. Other nations used slightly different proportions, ranging from potassium nitrate 77 parts down to 61.5 parts. The sulphur is the most constant of the ingredients, while the charcoal varies from 23 to 12.5 parts.

Brown or cocoa powder received its name

from the color of charcoal used. It consisted of about the following proportions in the dried powder of the usual ingredients: nitre 79 per cent, sulphur 3 per cent, and charcoal 18 per cent, although when in actual use it contained about 2 per cent of moisture. The charcoal used was a lightly baked material, and the percentage of carbon that it contained was therefore but slightly higher than that of the wood or straw from which it was made. This variety of gunpowder found its chief use in heavy breechloading guns in the forms of hexagonal prisms. The rate of combustion of the brown powder is slower than that of the black, and therefore for equal muzzle velocities of the projectile it produces less pressure in the powder chamber of the gun than black powder; also it yields a thinner smoke than the latter. This variety of powder gives on explosion a greater quantity of heat and a smaller volume of permanent gases than does an equal weight of black powder. Brown powder has been displaced by smokeless powder (q.v.) and other high explosives. See EXPLOSIVES.

Mining or blasting powder, which is used for blasting purposes (see BLASTING), usually has a lower amount of potassium nitrate than military powder, so as to make it slow burning, and the proportions are from potassium nitrate 70 parts, sulphur 18 parts, and charcoal 12 parts, to potassium nitrate 62 parts, sulphur 20 parts, and charcoal 18 parts. The manufacture of blasting powder became an important industry in the United States when the construction of canals and railways and mining operations began to be undertaken on a large scale. With the increased demand for blasting powder, which originally did not differ from ordinary powder, it was found necessary to make a less expensive substance, and accordingly it was found by L. Dupont of Wilmington in 1857 that sodium nitrate or Chilean saltpetre could be substituted for the far more costly potassium nitrate or India saltpetre. As a result of this discovery the manufacture of blasting powder has attained considerable importance, and in 1909 there were 38 different establishments in the United States engaged in this industry, and their output in that census year was 233.477.175 pounds of blasting powder, valued at $9,608,265.

Gunpowder, when of good quality, should have a specific gravity between 1.50 and 1.85. It explodes at about 313° C. (595° F.), and when ignited on a piece of white paper should burn away rapidly, leaving no residue. If black spots are found, they indicate an excess of charcoal, or imperfect mixture, while yellow spots show excess of sulphur. Many studies have been made of the products of combustion of gunpowder, and the results obtained seem to show that the gases formed are, in proportions varying according to the quality of the powder, as follows: carbon monoxide, carbon dioxide, nitrogen, hydrogen sulphide, marsh gas, hydrogen, and oxygen. The temperature produced by the explosion of gunpowder is estimated at from 2100° to 2200° C. (3812° to 3992° F.), according to the quality of the powder; and the quantity of heat evolved in gram-degree units ranges from 837 down to 518.8.

The production and value of gunpowder, including blasting powder, produced in the United States is given by decades in the following table from the Thirteenth United States Census:

YEAR	Number of establishments	Capital	Average number of wage earners	Product	
				Pounds	Value
1840	137	$875,875	496	8,977,348	
1850	54	1,179,223	579	....	$1,590,332
1860	58	2,305,700	747	....	3,223,090
1870	33	4,060,400	939	....	4,011.839
1880	33	4,983,560	1,011	....	3,348,941
1890	37	9,609,975	1,622	95,019,174	6,740.099
1900	47	8,297,773	1,708	123,314,103	5,310,351 *
1909	46	....	....	246.339,875	11,344,692

* Of the 1900 production 97,744,237 pounds, valued at $3,880.910, were blasting powder, and 25,638,804 pounds, valued at $1,452,377, were black powder, produced by 10 different establishments.

Bibliography. Consult the article on “Gunpowder,” in Spon, *Encyclopædia of the Industrial Arts, Manufactures, and Commercial Products* (London, 1879–82); Thorpe, *Dictionary of Applied Chemistry* (ib., 1890–93); and especially Oscar Guttmann, *The Manufacture of Explosives: A Theoretical and Practical Treatise on the History, the Physical and Chemical Properties, and the Manufacture of Explosives, with a Full Bibliography* (New York, 1909): Heine, *Gunpowder and Ammunition* (London, 1904); also Escales, *Das Schwarzpulver und ähnliche Mischungen* (Leipzig, 1904). See ARTILLERY; BALLISTICS; EXPLOSIVES; GUNS, NAVAL; ORDNANCE: SMOKELESS POWDER: ETC.

GUNPOWDER PLOT, THE. A project for destroying the King, Lords, and Commons at the opening of Parliament on Nov. 5, 1605. While James I (then James VI of Scotland) was an aspirant to the English throne, he had given the Roman Catholics reason for believing that he intended to favor them. For a short time after his accession he showed them some favor. But when his policy was said to be encouraging seditious Jesuits to come to England, James joined Parliament in Catholic persecution. The judges of assize were permitted to put in force the penal laws against Catholics, in consequence of which several were put to death and several thousand were convicted of recusancy. Furthermore, James resolved on exiling the priests. Disappointed and angered by this severity, a few Catholics banded together to overthrow the government and to establish one of their own. The originator of the scheme was Robert Catesby, a man of good birth and of substance but with misdirected zeal, who had plotted against Elizabeth. First he took John Wright and Thomas Winter into his secret. After trying in vain to gain toleration for the Catholics through the mediation of Spain, these three men proceeded to their desperate task. They drew into the plot Guy Fawkes (q.v.), a soldier of fortune, who had made a reputation in war, and whose character was determined and fearless, and Thomas Percy, a relative of the Earl of Northumberland. They began to undermine Parliament House from an adjoining tenement, which was hired in Percy's name. One day after they had laboriously pierced the wall, three yards thick, they discovered a vault under the House of Lords. Finding that this cellar was soon to be vacant, they hired it, and stored in it barrels of gunpowder, which they covered with stones, iron bars, and billets of wood. Their object was not only to conceal the powder, but also to supply an abundance of destructive missiles. While this work was progressing, a brother of Wright, a brother of Winter, and a few other obscure persons were added to the conspirators. But they needed money; and to supply it three others were induced to join the plot—Sir Everard Digby, of Gatehurst in Buckinghamshire, a young gentleman of large estates; Francis Tresham, a follower of Essex, like Catesby and Percy, but unlike them a cold, selfish man little suited to a conspiracy of the kind; and Ambrose Rokewood, also a wealthy gentleman, residing in the country. In the final arrangement for the execution of their plot at the assembling of Parliament on November 5, Fawkes was to set fire to the gunpowder in the cellar and then flee to Flanders in a ship provided from Tresham's money and waiting ready on the Thames. All went well until some of the plotters sought means of warning their Roman Catholic friends in Parliament of the impending danger, in which matter they hit upon no common plan of action. Ten days before the opening of Parliament Lord Monteagle, a brother-in-law of Tresham, was at supper in his country house at Hoxton, when a page handed him a letter received from a stranger, advising him "to devise some excuse to shift off your attendance at this Parliament, for God and man hath concurred to punish the wickedness of this time." That this letter was written by or for Tresham there can be little doubt, though Tresham himself when accused by Catesby positively denied it. That he desired to save his friend would be of itself a sufficient reason for writing it; but it is not altogether improbable that Tresham wished to expose the plot and at the same time allow his fellow conspirators an opportunity to escape. That they might have escaped but for the unreasonable hopes of Catesby and Percy is all but certain. On the evening of the 4th the Lord Chamberlain and Lord Monteagle visited Parliament House, and, entering the cellar in a casual way, told Guy Fawkes, whom they found there, and who passed as Percy's servant, that his master had laid in plenty of fuel. In spite of this direct warning Fawkes clung to his post, though escape was still possible; and on the morning of the 5th, a little after midnight, he was arrested as he came from the cellar dressed for traveling.

On his person the magistrate found slow matches, and in the cellar a lantern burning, and a hogshead and 36 barrels of gunpowder. Examined under torture, Fawkes confessed his own guilt and after long obstinacy revealed the names of his associates. Nearly all the others were killed on being taken, or died with him on the scaffold. Tresham, who at first went about openly, was finally arrested, and died of sickness in the Tower. Fawkes was a man of some excellent qualities; his aim was unselfish, but his zeal was wholly misdirected. So far from remedying the oppression of the Roman Catholics, the plotters greatly increased their miseries. The memory of this mad plot, invested with much fiction and intentionally enveloped in mystery for state and religious purposes, was long perpetuated by an annual festival on November 5, in which it was customary to burn Fawkes in effigy.

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GÜNS, gụns, *Hung.* **KÖSZEG**, kẽ′sĕg. A free royal town in the County of Vas, Hungary, situated on the river Güns, 11 miles by rail northwest of Steinamanger (Map: Hungary, E 3). Above it tower the Altenhaus (2000 feet), and the Geschriebene Stein (2900 feet). It has an old fortified castle of the princes of Eszterházy, a fine modern church, and two convents. Its educational institutions comprise a Gymnasium and a military school; there are also cold-water baths. Güns obtained municipal rights in 1328 and became a free royal town in 1648. It offered gallant resistance to the Turks in 1532. Its trade consists of flour, fruit, and wine. Pop., 1900, 7930; 1910, 8423.

GUNS, NAVAL. Neither gunpowder nor guns were invented in the modern sense of the word. They were developments that in their earlier forms were scarcely distinguishable from previous types. Greek fire (q.v.) and other ancient incendiary compositions contained all of the essential ingredients of gunpowder, and it was discharged through tubes, the prototypes of guns, placed in the bows of galleys. The force with which the flame and gas issued from the tubes may have led to placing darts or hard substances in the tubes so that they might be thrown out as projectiles. The earliest guns of which we have knowledge were certainly very crude affairs, and their immediate predecessors were probably cruder still, so that the importance of the impending change was not realized. If we regard the incendiary tubes as the prototypes of the gun, the latter seems to have been first developed in naval warfare.

The earliest record of the use of guns on shipboard is derived from an old Japanese painting of the repulse of the Mongol fleet off the shores of Japan in 1281 A.D., the fleet being shown wreathed in smoke from its guns. Kublai Khan, the Mongol-Chinese Emperor, certainly had an ordnance department at this time, and it is not unlikely that he mounted some guns on the vessels of his fleet. The first recorded use of guns on European ships is in the thirteenth century. In 1350 the Moors of Spain are said to have used cannon in a sea fight with the Moors of Tunis, and in 1387 the French and English fleets fought at sea with guns. Up to this time the pieces were fired over the rail of the ship, but early in the fifteenth century gun ports were invented—a suggestion of Descharges, a shipbuilder of Brest—and the number of pieces carried rapidly increased, so that towards the end of the century the Queen of Louis XII made a present to the French people of the *Cordélière,* a ship carrying 60 guns; and the English immediately built a very similar vessel, the *Regent,* to oppose her. The guns carried on these ships were mostly breechloaders, and we are struck by the fact that they still retained a removable chamber for the powder, similar to the charging piece of the incendiary tubes used in the old galleys. The inefficient closing of the breech made the guns very ineffective, and breech-loading was very generally abandoned in the early part of the seventeenth century. The metal of the earlier guns was wrought iron or brass, but after the general introduction of muzzle-loaders it was either cast iron or cast brass. Some of the early guns were rifled; at the Woolwich Arsenal there is a barrel dated 1547 which is rifled with six grooves, of a twist of one turn in 26 inches.

By the year 1600 rifled small arms firing spherical lead bullets were common, but the disuse of heavy breech-loading guns prevented the development of rifled artillery. Guns of very large size were made in the fifteenth century, those used by Mohammed II in the siege of Constantinople in 1453 having a calibre of about 25 inches, and firing a stone ball of over 600 pounds weight (see ARTILLERY); and still larger ones with a calibre of 30 inches, and firing stone balls of 1100 pounds' weight, are yet to be seen in some of the old batteries on the Dardanelles. Iron shot began to be used about the middle of the fifteenth century, though stone shot were not wholly given up for many decades after this. By the end of the sixteenth century the batteries of ships had become formidable. The Spanish Armada of 1588 was composed of 130 ships carrying 3165 guns, most of which were 4, 6, and 10 pounders, but the two largest ships, the *San Lorenzo* and *Nuestra Señora del Rosario,* were better armed. The former carried four 60-pounders, eight 30-pounders, six 18-pounders, six 9-pounders, 10 6-pounders, and 16 small guns—50 guns in all; the latter mounted three 30-pounders, seven 24-pounders, four 18-pounders, one 9-pounder, and 26 small guns, or 41 guns in all. The *Triumph,* the largest English ship in the fleet which opposed the Armada, carried four 60-pounders, three 30-pounders, 17 18-pounders, eight 9-pounders, six 6-pounders, and 30 small guns, or 68 guns in all.

Sir Jonas Moore, writing in 1689, says: "All artillery are commonly reduced to three sorts: The first is that of the Culvering, the second Cannons of Battery, the third Cannons Petrieri. To offend afar off, in case of strong resistance, the Culverings do serve, which carries a ball of iron from 14 to 30 pounds weight, though some make these to 120 pounds. As to calibre they are called Whole-Culvering, Culvering, and Demi-Culvering. The Whole-Culvering are called anciently Dragon-Drakes, and carry a ball of iron from 40, 50 to 60 pounds, etc. The Culvering from 35, 30, 25, 20 pounds. The Half-Culvering from 18, 16, and 14. As to length, they distinguish the Culvering into ordinary, extraordinary, and bastard. The ordinary Culvering are long from the touch-hole to the muzzle, 32 calibres. The extraordinary are longer than the ordinary, viz., to 39, 40, and 41 calibres. The bastard are shorter than the ordinary, viz., only 28, 27, and 26. The Cannons of Battery are pieces ordinarily shorter than Culverings. The One-fourth Cannon carries a ball of iron from 16 to 18 pounds. The Demi-Cannon from 20 to 28 pounds. The Cannon from 30, 40, 45 to 50 pounds. The Whole-Cannon from 70 to 120 pounds. The Cannon-Royal from 130 to 150 and 200 pound ball, used by the Turks. The Petrieroes are so called from its ball of stone, with which they are loaded, from 2 to 100 and 150 pounds." An illustration of the Culverin will be found in the article ARTILLERY.

During the seventeenth century ships increased in size and in battery power, but there was little change in the guns from the muzzle-loaders of 1600. Early in the eighteenth century the method of boring out the guns instead of casting them hollow and not boring out, added something to their accuracy and power. Robins, who published his treatise on gunnery in 1742, invented the ballistic pendulum (see BALLISTICS) for measuring velocities and pointed out the advantages of rifling and of elongated projectiles.

Until after the War of 1812 the heaviest pieces in use were the long 32-pounder of 55 hundredweight, and the 42-pounder of 57 hundredweight. The advantages of large calibre were understood, as may be seen by the adoption of carronades, but long guns firing projectiles of this size were too heavy for use on board the ships of the day. These pieces were generally fired by means of a priming and slow match; Sir Charles Douglas brought out the flintlock about 1780, but it was not until after Rodney's battle of April, 1782—in which action was the *Duke,* previously commanded by Sir Charles, and having guns fitted with flintlocks at his own expense—that the advantages of the lock were appreciated. No measures were taken to supply these locks until 1790, when brass locks of a new pattern were supplied, and used up to 1818. The discovery of a composition which could be ignited by friction or percussion was made in 1807 by G. Forsyth, a clergyman. Sir Charles Douglas designed quill primers for his locks about 1780, and a modification of these was used for the new percussion locks. Flintlocks continued in general use up to 1835 or 1840. In 1828 percussion locks were fitted to the guns of the U. S. S. *Vandalia,* but they were not exclusively used in the United States Service until 1842, when Hiddon patented the hammer with a slot permitting it to be drawn back from the vent. In 1832 an efficient percussion lock was introduced into the French navy; the British continued to use some flintlocks until about 1845, when they adopted a modified form of Hiddon's lock.

Sighting was effected by looking along the "line of metal," and decisive actions necessarily took place at close range. Soon after 1801 fixed sights on guns were adopted in the British navy, but the invention of the movable rear-sight, attributed to Colonel Jure of the French army, did not take place until much later, the method of allowing for distance being to shoot at certain parts of the ship which were higher than the point to be hit.

The next important improvement was the development of the shell gun by General Paixhans. In his *Nouvelle Arme,* published in 1821, he most strongly advocated the abandonment of the use of solid shot in long guns and the adoption of explosive shell, which had hitherto been fired from mortars and howitzers only. General Paixhans's views were adopted, and shell guns were introduced in all navies. The consequences of the introduction of shell guns General Paixhans also foresaw; in 1824, after the new guns were adopted in the French navy, in an official letter to the government he prophesied that the new departure in projectiles would force the creation of armored ships. His prophecy was fulfilled, and the armored ships in turn caused the development of the rifled gun. In this France was again the leader. During the Crimean War some 6.5-inch cast-iron rifles were made and mounted for trial on board ship. These were muzzle-loaders of crude design modeled after the Paixhans shell guns and used studded projectiles; but they proved to be so much more powerful against armor that they immediately gained favor. Other countries followed suit in the development of rifled guns. Prussia decided upon a breechloading rifle, and in England Armstrong and Whitworth brought out breechloaders. Krupp's earlier pieces were muzzle-loaders, but in 1862 he exhibited at London his first five cast-steel breech-loading guns. Armstrong brought out his breech-loading rifled field gun in 1855, and naval guns a year or more later. In 1858–59 a series of competitive trials of Whitworth and Armstrong breech-loading rifles resulted in the adoption of the latter. But the method of breech closure was very defective, and after numerous serious accidents the navy demanded a return to muzzle-loaders. The French adopted breechloaders in 1862, but adhered to cast iron as a cannon metal until 1875. The retention of cast iron by the French and the return to muzzle loading in England left Krupp's primacy undoubted (as we view the question now), but of course this was not acknowledged at the time.

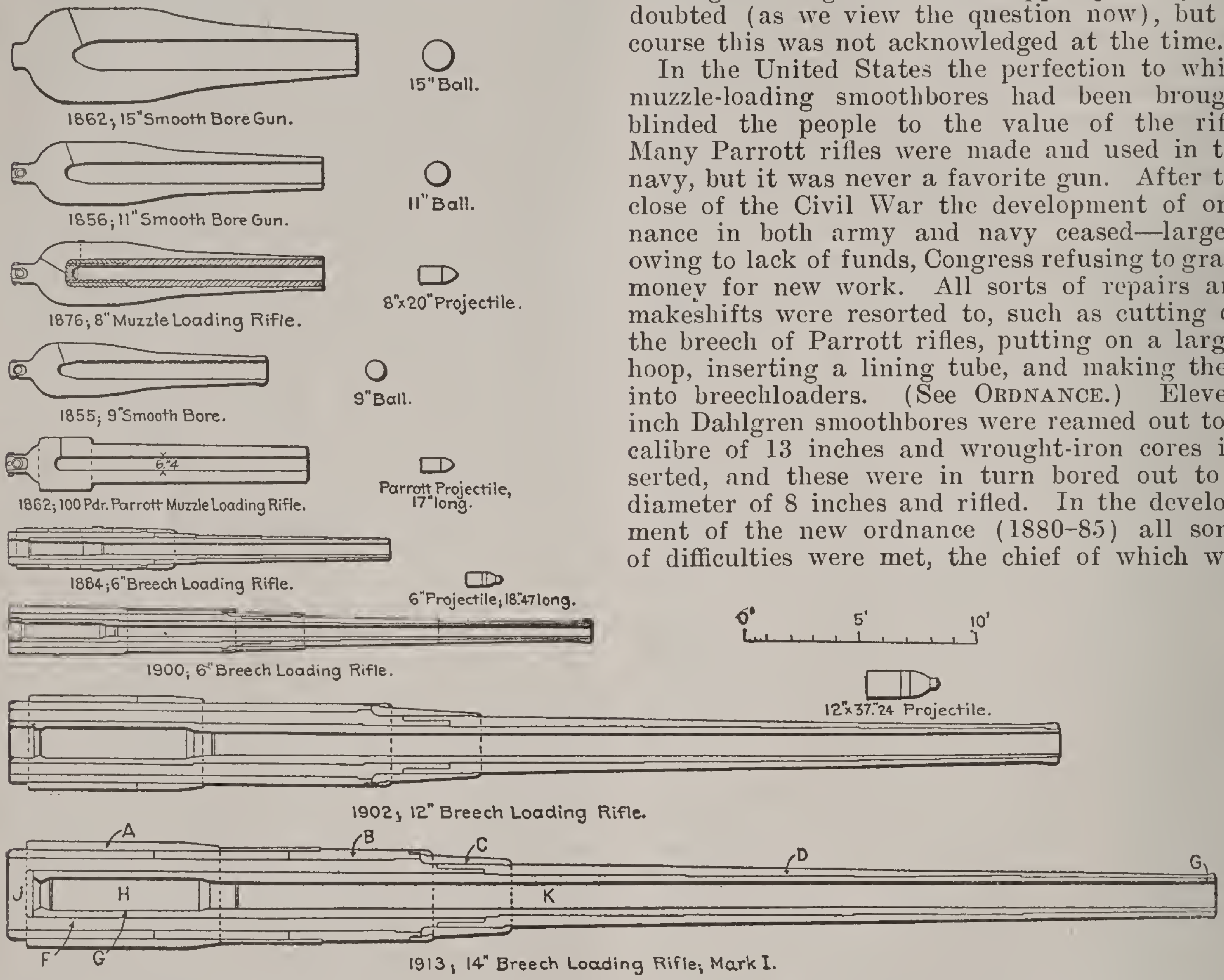

15" Ball.
1862; 15" Smooth Bore Gun.
11" Ball.
1856; 11" Smooth Bore Gun.
8"x20" Projectile.
1876; 8" Muzzle Loading Rifle.
9" Ball.
1855; 9" Smooth Bore.
6.4
Parrott Projectile, 17" long.
1862; 100 Pdr. Parrott Muzzle Loading Rifle.
1884; 6" Breech Loading Rifle.
6" Projectile; 18.47 long.
1900, 6" Breech Loading Rifle.
0' 5' 10'
12"x37.24 Projectile.
1902, 12" Breech Loading Rifle.
A
B
C
D
G
J
H
K
F
G
1913, 14" Breech Loading Rifle; Mark I.

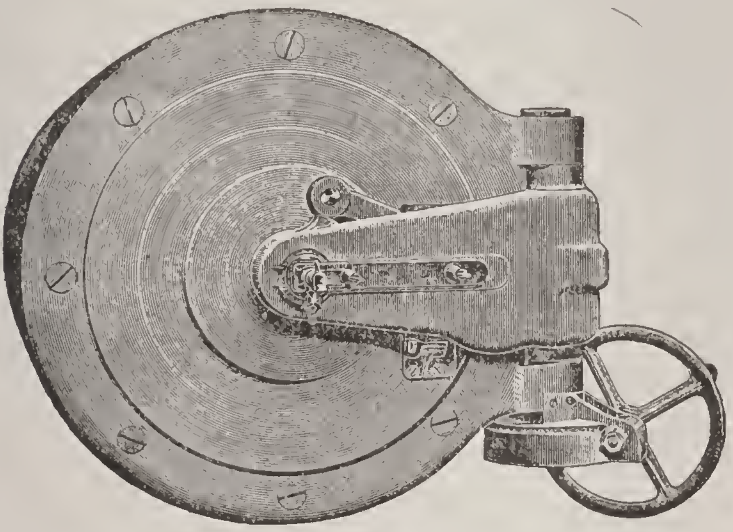
DIAGRAM ILLUSTRATING DEVELOPMENT OF GUNS AND PROJECTILES IN UNITED STATES NAVY FROM 1855 TO 1913.

In the section of the 14-inch gun *A, B, C, D* indicate the hoops; *F*, the jacket; *G*, tube; *H*, powder chamber; *J*, screw box; *K*, bore.

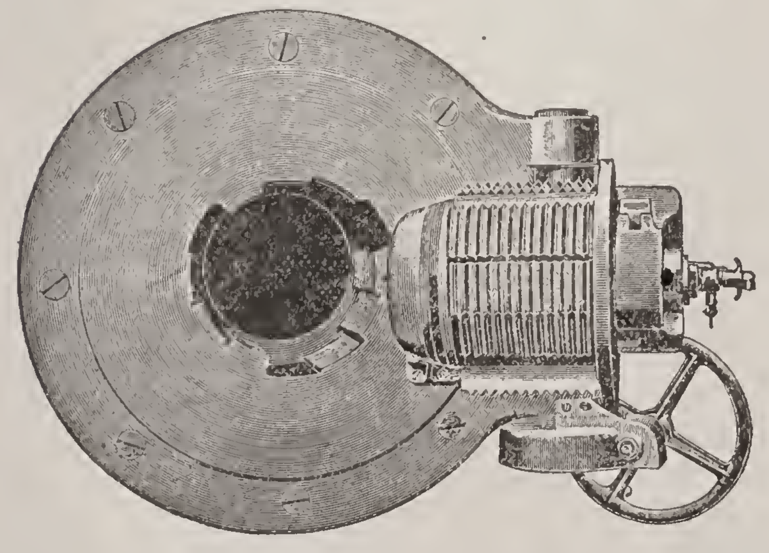
TYPE OF GUN	Weight of gun	Length of gun	Charge of gun	Weight of shell	Initial velocity per second	Muzzle energy ft.-tons
15-in. smoothbore	18.7 tons	15 ft. 7.0 in.	35 lbs.	350 lbs.	1,600 ft.	7,997
11-in. smoothbore	7.14 "	13 " 3.7 "	27 "	166 "	1,062 "	1,300
8-in. muzzle-loading rifle	7.76 "	13 " 3.7 "	35 "	180 "	1,430 "	2,627
9-in. smoothbore	4.0 "	11 " 0.0 "	10 "	70 "	1,320 "	847
100-pdr. Parrott	4.35 "	12 " 1.4 "	10 "	100 "	1,080 "	810
6-in. breech-loading rifle	4.74 "	16 " 4.0 "	36 "	100 "	2,000 "	2,773
6-in. " "	8.46 "	25 " 0.0 "	40 "	100 "	2,900 "	5,838
12-in. " "	53.4 "	45 " 0.0 "	360 "	850 "	2,800 "	46,246
14-in. " "	67.0 "	52 " 6.0 "	550 "	1,400 "	2,600 "	70,730

In the United States the perfection to which muzzle-loading smoothbores had been brought blinded the people to the value of the rifle. Many Parrott rifles were made and used in the navy, but it was never a favorite gun. After the close of the Civil War the development of ordnance in both army and navy ceased—largely owing to lack of funds, Congress refusing to grant money for new work. All sorts of repairs and makeshifts were resorted to, such as cutting off the breech of Parrott rifles, putting on a larger hoop, inserting a lining tube, and making them into breechloaders. (See ORDNANCE.) Eleven-inch Dahlgren smoothbores were reamed out to a calibre of 13 inches and wrought-iron cores inserted, and these were in turn bored out to a diameter of 8 inches and rifled. In the development of the new ordnance (1880–85) all sorts of difficulties were met, the chief of which was the crop of ideas which the mistaken views of the preceding 20 years had fostered. The Dahlgren and Rodman smoothbore guns had become an article of faith with the American people, who had been taught to believe that their naval successes were due to cast-iron smoothbore guns, instead—which was the fact—of being won in spite of them. Numerous inventors and manufacturers appeared before Congress with ideas based upon previous mistaken practices, but the breech-loading, forged-steel, built-up gun conquered its way past all attempts to supplant it. The slotted-screw breech block was used in all the new guns. The design of these pieces was practically the same as that of the best European practice, and included a tube extending the full length of the bore; a heavy jacket in one piece extending from the breech end of the tube for a little more than half its length; over the jacket a row of hoops and over the tube beyond the jacket, hoops extending part way or all of the way to the muzzle. The first guns were made of 30 calibres' length; between 1883 and 1890 the length increased to 35, after 1890 to 40 and 45 calibres, and in 1899 to 50 calibres in the sizes below the 7-inch. In 1910, 50-calibre 12-inch guns were completed, and, in 1913, 14-inch guns of 45 calibres were placed on the *Texas* and *New York*. This latter was in 1914 the standard calibre for United States battleships.

The breech mechanisms used in the United States naval service are the Fletcher (several modifications), Dashiell, Vickers-Maxim, Hotchkiss, and Driggs-Schroeder. The Fletcher, which is a development of the Farcot system, is probably the simplest and is certainly one of the neatest and strongest breech mechanisms known. A worm wheel on a vertical spindle works in a rack on the breech plug and first causes it to turn and disengage the threads and then move to the rear and turn out clear of the breech. The vertical spindle is driven by a worm and worm wheel in the larger calibres, in the smaller ones simply by a handle pivoting on it. The Dashiell and Vickers-Maxim are operated by a short arm driven from the vertical axis of the operating lever, which shifts its centre during the motion. The Hotchkiss breechblock is a vertically sliding wedge, and the Driggs-Schroeder block drops to clear its upper end from the housing of the breech and then revolves to the rear about a horizontal axis; these two mechanisms are only used in 6-pounders and smaller pieces. See Rapid-Fire Guns.

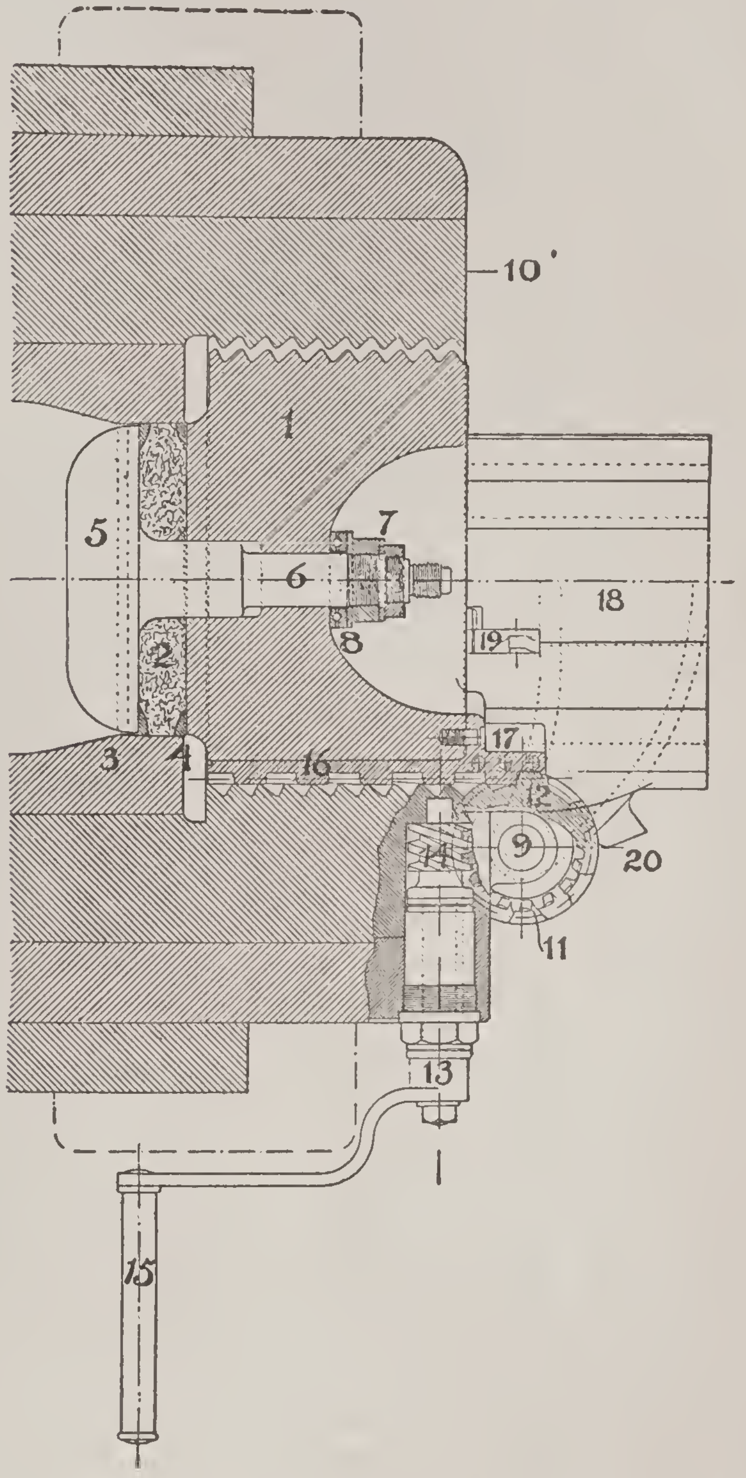


Breech closed.



Breech open.

EARLY TYPE OF VICKERS BREECH MECHANISM, SHOWING WELIN BREECH.



U. S. N. MARK VI BREECH MECHANISM FOR 12-INCH GUNS. HORIZONTAL SECTION AND PLAN.

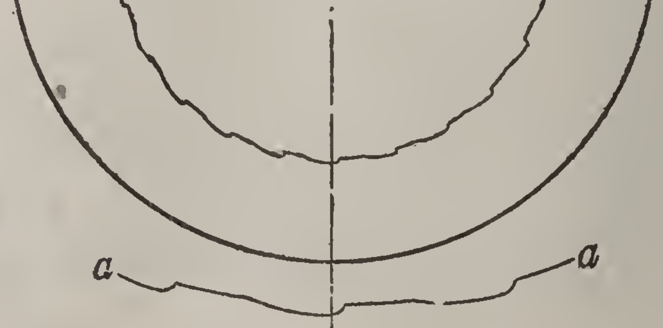
1, breechblock; 2, mushroom pad; 3, rear end of tube; 4, rear pad ring; 5, mushroom head; 6, mushroom stalk; 7, lock nut; 8, frictionless washer; 9, vertical shaft, carrying pinion (11) and worm wheel (12) for withdrawing and turning aside the breechblock; 10, face of breech; 11, pinion for turning shaft (9); 12, worm for rotating breechblock; 13, worm shaft driving pinion (11) and causing shaft (9) to turn; 14, worm driving 11; 15, crank for operating 13; 16, screw threads (block is shown disengaged, ready to be withdrawn); 17, rack on plug in which 12 operates; 18, plug tray or carrier to receive breechblock; 19, tray latch. In the latest types of breechblock (models of 1912 and 1913) the side of the breechblock opposite the hinge or pinion (9) is cut away in the arc of a circle so that the block is turned out at once without the necessity of retraction. The threads of the block and seat are cut in this curved surface to fit a corresponding curvature in the breech.

All new guns in the United States navy are fitted with the Welin system of breech closure, a modification of the slotted screw. The inside of the screw box is cut away in steps in the following manner: It is divided by 12 (usual number) radial planes; three of the sectors are smoothed out to a maximum diameter and form the *blanks* of the screw box; the next sector (in the direction towards which the block turns in closing) has a radius which is less by a little more than the height of the threads on the block or in the screw box; the next has a radius smaller than the preceding by a similar amount; the next sector is likewise reduced in radius; while the next is another blank from which the succeeding sectors rise in steps, as from the first one. The advantage of the Welin system is that three-fourths or five-sixths (if desired) of the circumference of the block is available for screw surface to resist the powder pressure instead of one-half, as in the old block of ordinary model; this enables the Welin block to be made shorter and therefore lighter.

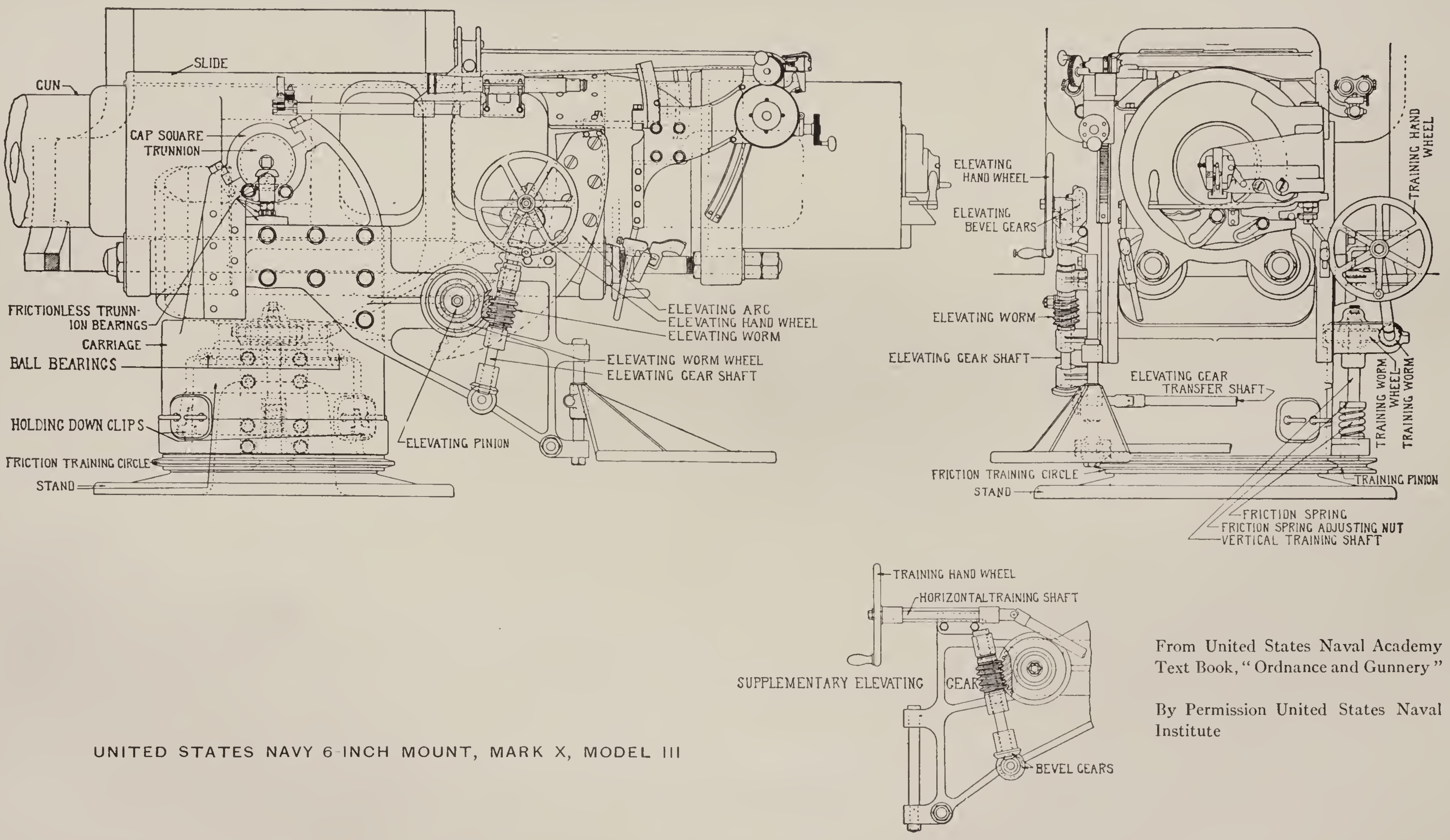
The gas checks used in naval guns are the Broadwell ring or cup gas check used by Krupp and some modification of the De Bange gas check, such as is used in United States naval ordnance and in nearly all ordnance using a screw breechblock. The Broadwell ring is a steel ring with a section somewhat like a letter L. When the gun is fired, the pressure of the powder gas presses the lips of the ring against the walls of the chamber and against the face of the breechblock and so cuts off the escape of the gas to the rear. The De Bange gas check is more complicated. As originally made, it consisted of a ring-shaped pad of asbestos saturated with suet, covered with canvas, and held between two disks with large holes through their centres, through which and the hole in the pad passes the stalk of the steel block called the *mushroom* because of its shape. The disks holding the pad between them are themselves held between the mushroom head and front face of the breech plug. The opposing faces of the disks are hollowed out so that a section of one side is somewhat like half of the letter I. When the powder pressure acts on the mushroom head, the pad is squeezed and forced out against the surface of the bore, and at the same time the outer lips of the disks are also forced outward against it; this combination of metallic and pad contacts cuts off all escape of gas to the rear. In the latest types of gas checks used in United States naval guns the shape of mushroom head, gas check, and rings has been modified, but the principle remains the same. The rear disks are double—one at the outer and one at the inner edge of the pad; the front disk is much smaller and only extends a short distance from the outer edge.

Naval guns are fired by means of electric, percussion, combination (electric and percussion in one), or friction primers, which set fire to the charge. Electric and percussion primers are both used, but the former are preferred, and the latter employed only when the other fails. By the use of somewhat higher voltage the certainty of operation of the electric primer is increased, and its greater safety and ease of ignition render it more desirable. As the primer seats in the breechplugs of nearly all service guns have been prepared for the large combination primer, the present electric and percussion primers are of the same size, which is about that of a 32-calibre cartridge shell of double the usual length. The ignition of the percussion primer is caused by the blow of a firing pin pressed forward by a spring; that of the electric primer by an electric current which passes through a platinum bridge in it. The heating of the platinum bridge ignites the priming composition, which in turn ignites the fine black powder in the body of the primer. The flame of this powder is sufficient to start the burning of the ignition charge of black powder in the cartridge. This ignition charge of black powder is used because smokeless powder is not easily or quickly ignited. The lock in which the primer is seated is screwed on the rear end of the mushroom stem, and the flame of the primer must pass through a hole in the axis of the stem before it reaches the charge. In guns using fixed ammunition the primer is sunk in a recess in the head of the case. All locks in service in the United States navy are fitted to use either percussion or electric primers. In all cases they screw on the rear end of the mushroom stem. Somewhat similar locks are used in European and other navies. To prevent premature firing of guns—for it is convenient to insert the primer while loading is going on—the electric circuit is not complete through the primer until the breechblock is closed and fully turned into place, so that the contacts placed in the proper position are pressed together; the pressure of the firing key will then complete the circuit. In quick-fire and rapid-fire guns (see Rapid-Fire Guns) a detent holds the percussion firing pin back so that it cannot strike the primer until the breech is closed and locked. The electric current for firing is obtained from electric batteries at the guns or a current of reduced voltage derived from the dynamo.

The rifling of United States naval guns is polygroove with a twist which increases from zero to one turn in 25 calibres; i.e., the projectile starts along grooves which at first are parallel to the axis of the bore, but which almost immediately begin to incline to form a spiral on its inner surface, the inclination increasing to a point near the muzzle from which the spiral is uniform; the projectile is thus caused to rotate faster and faster, until, when it leaves the muzzle, it is spinning at a rate that will make it revolve once while moving a distance equal to 25 times its diameter. The grooves are 0.05 inch in depth and several times as wide, but decrease in width as the muzzle is approached, and their number is usually four times the calibre expressed in inches (for a 6-inch gun, 4 × 6 = 24); but there are some exceptions.



SECTION OF UNITED STATES NAVY 6-INCH GUN SHOWING RIFLING. ALSO ENLARGED PLAN OF RIFLING (*a*, *a*).

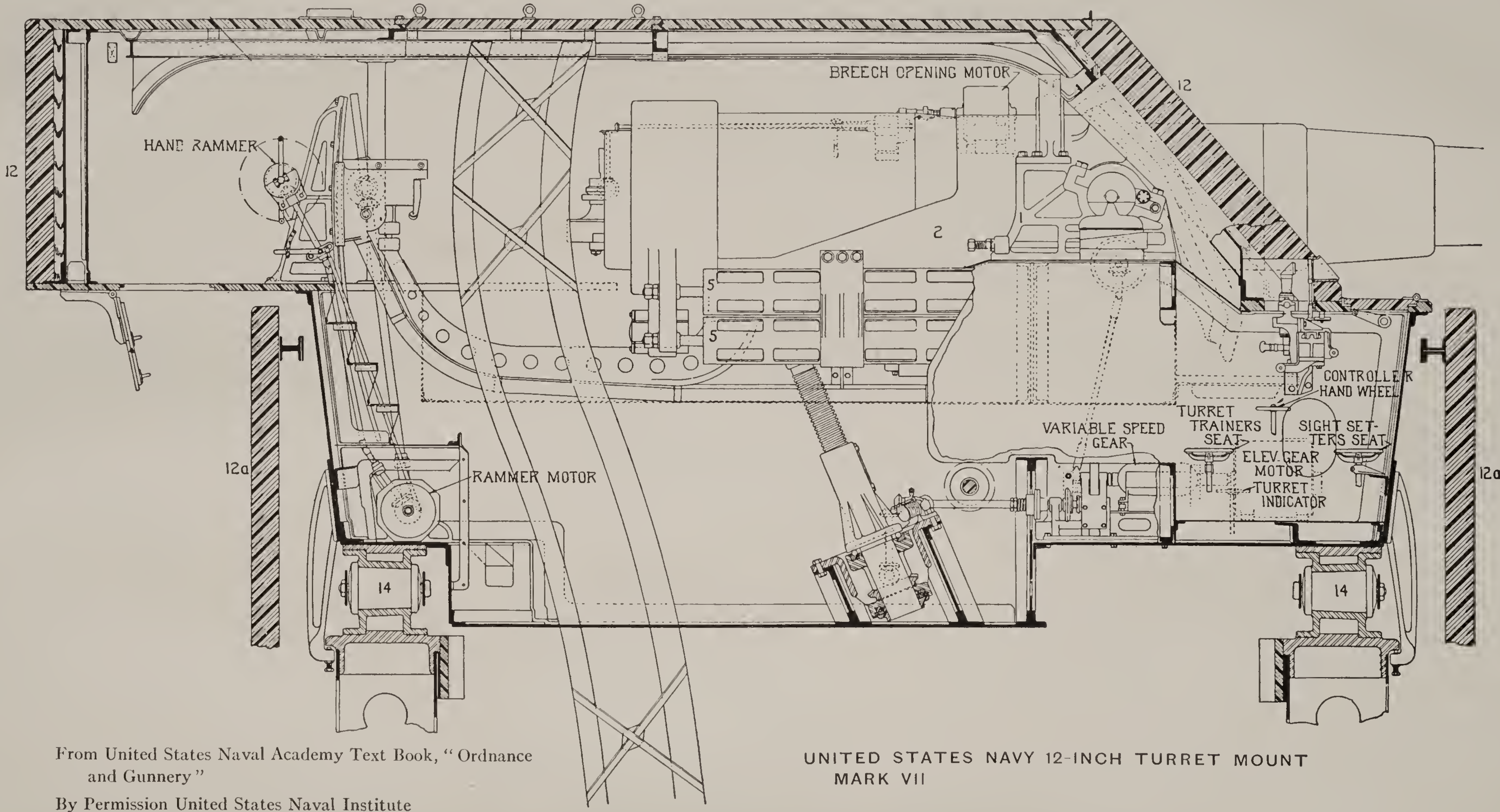


UNITED STATES NAVY 6-INCH MOUNT, MARK X, MODEL III

From United States Naval Academy Text Book, "Ordnance and Gunnery"

By Permission United States Naval Institute

PEDESTAL MOUNT FOR 6-INCH GUN



From United States Naval Academy Text Book, "Ordnance and Gunnery"

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UNITED STATES NAVY 12-INCH TURRET MOUNT
MARK VII

TURRET MOUNT AND MECHANISM

In the design of naval guns the weights are kept down as much as possible, as every additional ton of weight carried involves three or four tons' extra displacement in the ship. In guns for forts and fixed defenses on shore small savings in weight are unimportant.

The recent increase in calibre of naval guns was brought about for reasons given in the article on GUNNERY. The largest gun so far mounted on board ship is the 15-inch gun placed on recent British ships. Other nations are using or intend to use guns of 12 to 15.1 inches. The general tendency seems to be towards adopting calibres between 14 and 15 inches, though the United States navy has designed and in 1914 was building guns of 16 inches for trial. Wire-wound guns are used in the British service, and some of this type have been built for Japan; but the naval authorities of other countries do not favor them. A chamber pressure of about 17 tons is as high as it is desirable to go, because the erosion of the bore increases rapidly with pressures above 12 tons. It is possible to make a built-up gun which is amply strong to stand a pressure of more than 20 tons to the square inch, so that the increased strength of the wire-wound gun is unnecessary. Moreover, wire-wound guns lack stiffness or longitudinal rigidity, and this reduces accuracy.

TABLE OF ELEMENTS OF LATE TYPES OF UNITED STATES NAVAL GUNS

GUN AND MARK	Length in calibres	Wght. of gun	Weight of projectile	Weight of powder charge	Muzzle velocity	Muzzle energy	Penetration at muzzle in Krupp armor, using capped projectiles	AT 3,000 YDS.		AT 6,000 YDS.		AT 9,000 YDS.	
								Remaining velocity	Penetration	Remaining velocity	Penetration	Remaining velocity	Penetration
		Tons	Lbs.	Lbs.	Ft. sec.	Ft. tons	In.	Ft. sec.	In.	Ft. sec.	In.	Ft. sec.	In.
3-in. M–V, VI	50	1.0	13	3.85	2,700	658	3.3	1,230	1.2	848	.8	....	...
4-in. M–VIII	50	2.9	33	12.3	2,800	1,794	5.3	1,627	2.6	1,033	1.5	878	1.2
5-in. M–VII	51	5.0	50	23.8	3,150	3,439	6.8	1,835	3.4	1,091	1.8	895	1.4
6-in. M–VIII	50	8.6	105	37.0	2,800	5,707	8.3	1,923	5.2	1,297	3.2	1,026	2.3
7-in. M–II	45	12.7	165	58.0	2,700	8,338	9.6	1,948	6.4	1,382	4.2	1,083	3.0
8-in. M–VI	45	18.7	260	98.5	2,750	13,630	12.0	2,106	8.6	1,589	6.1	1,227	4.4
10-in. M–III	40	34.6	510	207.5	2,700	25,772	15.6	2,184	11.9	1,747	9.0	1,406	6.9
12-in. M–VII	50	56.1	870	340.0	2,950	52,483	21.7	2,483	17.5	2,071	13.9	1,719	11.0
14-in. M–I	45	67.0	1,400	550.0	2,600	70,730	...	....	....	....	...	....	...

Mounts for Naval Guns. Mounts for naval guns are of three types: turret, deck, and rail—the latter being used on small vessels only. The principal features of mounts are the methods of supporting the gun, checking the recoil, returning the gun to the firing position after recoil, elevating, training, sighting, and loading. Up to the middle of the nineteenth century naval guns were mounted upon simple wooden carriages with heavy side frames or timbers supporting the trunnions and resting on little wooden wheels, called the trucks. The sides of the carriages were held together by framing, called transoms, the rear one being horizontal and supporting the elevating gear. The latter consisted at first of a large wooden wedge, but this was later replaced by an iron elevating screw. (See ORDNANCE.) The recoil was checked by a very large hemp rope, called the breeching, which passed through a score in a projection on the breech and was secured at each end to the ship's side; the length was sufficient to allow the gun to recoil several feet, and this not only reduced the strain on the breeching, but allowed the gun to come in far enough to be easily loaded. After loading, the gun was run out and trained by tackles.

The next step was the pivoting of guns and mounting the carriage on slide rails. Some guns pivoted amidships or on each side, and others pivoted to the side only. Mechanical appliances were soon afterward fitted to the slide rails for taking up the force of recoil. At first only friction was used, but the hydraulic cylinder followed a few years later. About 1885 central pivot carriages were devised. The earlier designs were very cumbersome and difficult to operate, but in a few years they developed into the pedestal mount turning on a nearly frictionless bearing of curved rollers; and this type, much improved from the early designs, is now used for broadside guns. A recent type of the pedestal mount is shown in the accompanying plate. In this mount the rack and pinion for training is replaced by friction gear. The gun can only be trained from the right side and elevated from the left. The carriage is supported on ball bearings. Later types use prismatic sights to reduce the port opening. The names of the different parts are given on the plate.

Broadside guns in battleships are now designed for use as defense against torpedo boats, as the range at which the greater part of a naval battle is likely to be fought renders them of little or no service, so that it is useless waste of life to man them under such circumstances. These guns are usually of 5-inch calibre in United States battleships of recent type and from 4 to 6 inch calibre in those of other nations.

Guns of 4-inch calibre and less are carried by cruisers, gunboats, and torpedo-boat destroyers. The latter, which are the real torpedo boats of to-day—the small torpedo boat having become obsolete—have reached a size of more than 1000 tons and carry 4-inch guns. The mounts of these and of the 3-inch are similar to those already described, but smaller and simpler. Six-pounder guns (2.2-inch) are still carried by gunboats and small cruisers and destroyers of the older types. They are mounted on cage (heavy tripod) stands or on rail mounts. The mechanism is simple; elevation and train being effected by the shoulder bar.

Turret mounts have changed very considerably in the last few years. In the ships under construction in 1914 the guns were installed three in a turret, the middle one being raised above the line of the others and drawn farther to the rear. This enabled the outer ones to be brought closer together. By putting three guns in a turret, a battleship with 12 heavy guns can carry her battery in four turrets on the midship line and fire six guns ahead and six astern by raising the second and third turrets high enough to fire over the first and fourth respectively.

The training and elevating of turret guns are effected by electric gear in nearly all navies, though very excellent hydraulic gear is used in some services. The guns may be fired simultaneously or separately; if separately, there must be an appreciable interval to let the smoke get clear, for even smokeless powder gives a cloud of vapor with some smoke, which is in part due to the black-powder ignition charges.

The danger of accidents in turrets has been greatly reduced by (*a*) an upper ammunition-handling room just below the turret, and (*b*) gas-ejecting mechanism which admits compressed air (100 pounds per square inch) to the bore before the breech is opened. This latter drives the heated gases out of the muzzle and prevents flarebacks. Danger from the sparks of electric switches has also been reduced by covering the entire switch mechanism.

The magazines and shell rooms are grouped about the lower handling room, though the main and reserve magazines may be on another deck below. If so, hoists connect them with the service magazines. The projectiles used by turret guns are all of the armor-piercing type with soft-steel caps. The bursting charge is of high explosive of some sort which is strong enough to burst the shell and yet sufficiently insensitive to shock to be fired through armor. The great difficulty has been to get a satisfactory fuse which would let the shell go through and then explode it.

Bibliography. Consult: *Annual Reports of Office of Naval Intelligence* (Washington); *Proceedings of the United States Naval Institute* (Annapolis, Md., current); *Annual Reports of the Chief of Bureau of Ordnance United States Navy;* Fullam and Hart, *Text-Book of Ordnance and Gunnery* (Annapolis, 1905); United States Naval Academy, *Text-Book of Ordnance and Gunnery* (ib., 1910); Brassey, *Naval Annual* (London, annually); *Naval Pocket Book* (ib., annually); *Scientific American* (New York, current); *Engineer* (London, current); *Engineering* (ib., current). See Rapid-Fire Guns; Machine Gun; Gunnery; Ordnance; Armor Plate; Ship, Armored; United States, *Navy;* Ammunition; Projectiles; Explosives; Gunpowder: etc.

GUNSAULUS, gŭn-sa̤′lŭs, Frank Wakeley (1856–). An American Congregational clergyman. He was born at Chesterville, Ohio, graduated at Ohio Wesleyan University in 1875, was ordained to the Methodist ministry, but became a Congregationalist in 1879, and was pastor of Congregational churches at Columbus, Ohio (1879–81), Newtonville, Mass. (1881–85), and Baltimore, Md. (1885–87). From 1887 to 1899 he was pastor of Plymouth Church, Chicago, and in 1899 accepted a call to the Central Church of that city. He was also president of the Armour Institute of Technology from 1893 to 1901. He became widely known as a preacher and lectured on "Savonarola" and "John Hampden." His writings include: *Metamorphosis of a Creed* (1878); *November at Eastwood* (1879); *Monk and Knight: An Historical Study in Fiction* (1889); *Phidias, and Other Poems* (1887); *William Ewart Gladstone* (1898); *The Man of Galilee* (1899); *Paths to Power* (1905); *Paths to the City of God* (1906); *Higher Ministries of Recent English Poetry* (1907); *The Minister and the Spiritual Life* (1911).

GUN′SHOT WOUND. A wound produced by a missile projected from a pistol, rifle, cannon, etc., by the force of any explosive. Such wounds may vary in severity from a simple bruise to the tearing away of a whole limb. Single balls produce an incised, bruised, or lacerated wound, according to the amount of their velocity when they strike the body. The effects of small shot vary with the distance and power of the gun; when at short range, the pellets enter so close together as to make one wound like that of a single ball. It was once commonly believed that the "wind of a large shot" could produce serious injuries; this belief may have arisen from the circumstance that when a heavy ball, which has lost some of its force, strikes the body at a particular angle, the skin does not always give way, but the deeper structures, such as the muscles, or large organs, as the liver, may be completely crushed. When a bullet perforates the body, the entrance opening, which is generally depressed, round, and regular, is often smaller than that of the exit. The modern conical ball makes a well-defined oblong wound; but it may shift its direction, strike longitudinally, and cause a more extensive injury to the skin. When a bullet strikes the shaft of a bone, it cracks or splinters it and either remains in or passes through the cancellated ends. In its course the ball may carry before it pieces of cloth, coins, or other foreign bodies, which increase the danger from the wound. The modern bullet of small calibre, traveling at a very high rate of velocity, such as the bullet projected by the new Springfield, Mauser, Lee-Metford, or Krag-Jörgensen rifle, produces a small round wound of entrance and a wound of exit of nearly, if not quite, similar character. As a rule, all tissues, including bone, are clearly perforated; but occasionally, when the fire is at close range, or where a soft-nosed bullet is employed, the destruction of tissue may be very great.

Hemorrhage is, as a rule, very slight, though occasionally a blood vessel of importance may be perforated. Injuries to the blood vessels are considerably more frequent with modern high-velocity projectiles than they were with the old-fashioned bullets of low velocity, which occasionally bruised the vessels, but more often pushed them aside instead of cutting them. Hebler, in 1882, was the first to describe the effect of the small-calibre rifle. He calls attention to their superior accuracy and to the production of more humane wounds. Hebler and others, however, have been perhaps overenthusiastic in their claims, which give the impression that to be hit by a modern bullet entails little more risk than to undergo an aseptic operation by a surgeon—an impression that is far from the real truth.

Arguing from a purely military point of view, Major Charles Lynch, of the United States army, in his official report as an observer with the Japanese army during the war with Russia, remarks: "While from the surgical standpoint the extremely small calibre of the Japanese rifle is desirable, it is a great question if they have not carried their desire for long range, flat trajectory, and light weight of cartridge too far, and have thus sacrificed the stopping power of the bullet to such an extent that their weapon does not yield the best results in war. A man hit with a Japanese bullet will come on when it has passed through his body anywhere, except at a vital point." Killing an enemy is not the prime object of modern military authorities, the infliction of death being simply an unavoidable incident of warfare. A dead soldier is merely a loss and after burial requires no further attention. A wounded man, however, does require care, and if sufficient numbers can be injured to oblige combatants temporarily to assist the sanitary forces, a great advantage has been gained.

So-called "explosive shot wounds" are a misnomer, no explosive effect being possible with modern rifle bullets. Civilized nations are strictly forbidden by international treaties to use explosive bullets. Greater shattering effects will, of course, be produced by nonjacketed bullets, such as are still used in ordinary revolvers. Hunters of large game sometimes resort to explosive bullets. In these the point or nose of the bullet is left unjacketed. Such a missile striking bone will break up into many parts and produce great damage, as is intended. Many persons who have been shot during the excitement of battle describe the initial sensation as resembling the sharp stroke of a cane; but in most instances the man soon begins to tremble, complains of cold, his face becomes pale, his pulse is scarcely perceptible, and he appears as if about to die. This is the condition termed *shock;* and though death sometimes does ensue during this state of prostration, it is not so serious as it appears, and the patient will probably pass out of it in a few hours, with the help of stimulants and rest. Although excessive bleeding is not so common after gunshot as after other kinds of wounds, it may occur immediately and to a fatal extent, if assistance be not afforded. The first assistance in the treatment of a gunshot wound is to preserve cleanliness in the locality of the injury. This is to be done by immediately applying a dressing or compress of gauze to the injured surface. In modern warfare every man who goes into the field is supplied with one of these sterile dressings in a compact form, with directions for applying it. In private practice, or under circumstances where a sterile dressing is not immediately at hand, the dressing should be wet with some antiseptic solution, such as carbolic-acid solution of a strength of 1 to 60, or mercuric chloride (corrosive sublimate), 1 to 1000. Where hemorrhage is free, pressure should be applied directly to the wound by means of compresses or with the hands or bandage. If this does not control the bleeding, an improvised tourniquet (q.v.) should be applied to the limbs. When a bone has been broken by the shot, a suitable splint or support must be applied. The further management of a case, beyond the administration of such stimulants as may be needed, should be in the hands of a surgeon.

At the present time surgeons do not probe for a bullet except in rare instances. To pass a probe through the opening made by a missile in several layers of tissue it is necessary to place the patient in the same position in which he was when the wound was received, if the tissues are movable or slide one upon the other. This is generally impossible; and very often the probe will make a false passage, opening up a new track for possible infection, and never strike the bullet. In the case of the embedding of a bullet in the brain, the substance of which is not contractile, and which alters but little in relative position to the skull after a gunshot wound, probing is allowable if the probe enters easily. It is most desirable to remove the bullet in such a case. Frequently its position may be inferred with considerable accuracy from the symptoms, and the X-ray will furnish exact information as to the location of the missile. Portable X-ray outfits are now available for use in field hospitals. Consult Lagarde, *Gunshot Injuries* (New York, 1914).

GUN'TER, ARCHIBALD CLAVERING (1847–1907). An American novelist and playwright. He was born in Liverpool, England, and when quite young was taken by his parents to California, where he was educated in the public schools and at the School of Mines of the State University. From 1868 to 1874 he was employed as a mining and civil engineer and chemist and from 1875 to 1878 was a stockbroker in San Francisco. He then removed to New York City and devoted himself to literature. He became the owner of the Home Publishing Company. His novels include: *Mr. Barnes of New York* (1887); *Mr. Potter of Texas* (1888); *That Frenchman!* (1889); *Jack Curzon* (1898); *A Manufacturer's Daughter* (1901); *My Japanese Prince* (1904); *Adventures of Dr. Burton* (1905); *A Prince in the Garret* (1905); *The Changing Pulse of Madame Touraine* (1906). His most successful plays are *Prince Karl* and *Mr. Barnes of New York.*

GUNTER, EDMUND (1581–1626). An English mathematician and astronomer, born in Hertfordshire. He was educated at Westminster and at Christ Church, Oxford, and became professor of astronomy in Gresham College (1619). He was an enthusiastic student of mathematics and a genius of no mean order. He observed the variation of the magnetic needle, improved the instruments for navigation, and invented the surveyor's chain. The latter, known as *Gunter's chain,* is 66 feet long and is composed of 100 links of 7.92 inches each. It is convenient in practice, since it is graduated on the decimal scale, and since 10 square chains make an acre. For certain purposes, however, chains (or steel tapes) of 50 or 100 feet (called engineer's chains) are more convenient. Gunter's sector or line consisted of a scale graduated according to the logarithms of numbers of sines, and of tangents, so that areas, heights, volumes, and other magnitudes could easily be calculated therefrom. He was the first (1622) to give the annual variation of the magnetic declination and to use arithmetical complements in logarithmic work. In 1618 he invented a portable quadrant for finding the hour and azimuth. His chief works are the *New Projection of the Sphere* (1623) and the *Canon Triangulorum,* or *Table of Artificial Sines and Tangents* (1620). His collected works were published in 1624 (2d ed., 1636; 5th ed., 1673).

GUNTHER, gụn'tẽr. A Burgundian king, in the *Nibelungenlied,* the brother of Kriemhild and husband of Brunhild, whom he won with the assistance of Siegfried. He was put to death by his sister Kriemhild.

GUNTHER, or **GUNTHERUS,** gụn'tẽr-ụs. A German poet, historian, and theologian, born in the twelfth century. He was long established as a scholiast in south Germany and became the teacher of Prince Konrad, a son of the Emperor Frederick Barbarossa. About 1215 he entered the Cistercian convent of Pairis in Alsace. He is the author of the two Latin epic poems *Solimarius* and *Ligurinus*. *Solimarius* was dedicated to Frederick Barbarossa in 1186, and treats of the First Crusade; but nothing remains of the work except a fragment discovered by Wattenbach in the Cologne Library. The poem entitled *Ligurinus* is considered the greatest mediæval Latin epic of Germany. It consists of six books and celebrates the achievements of the Emperor Frederick in northern Italy. The facts upon which it is based are taken largely from the *Gesta Friderici* of Otto von Freising. Apart from its high poetic value, it presents a faithful picture of the conditions of the time. Consult A. Pannenborg, *Der Verfasser des Ligurinus* (Göttingen, 1883).

GÜNTHER, gun'tẽr, ALBERT CHARLES LEWIS GOTTHILF (1830–1914). An English zoölogist, born at Esslingen (Württemberg). He was educated at the universities of Tübingen, Berlin, and Bonn, and became an assistant in the zoölogical section of the British Museum in 1856. In 1875 he was appointed director of the zoological section and in 1895 was superannuated. He was vice president of the Royal Society (1875–76), president of the biological section of the British Association (1880), and president of the Linnean Society (1898–1901). He founded and became the first editor of the *Record of Zoölogical Literature* in 1864, was a coeditor of the *Annals and Magazine of Natural History*, and contributed the reports on "Shore Fishes," "Deep-Sea Fishes," and "Pelagic Fishes" to the *Voyage of H. M. S. Challenger* (1887–88). For his services in the promotion of zoölogical science he was awarded gold medals by the Royal Society (1878) and the Linnean Society (1904). His publications include: *Medizinische Zoologie* (1858); *Catalogue of the Batrachia Salientia and Fishes in the British Museum* (10 vols., 1858–70); *The Gigantic Land-Tortoises, Living and Extinct* (1877); *Introduction to the Study of Fishes* (1880); *Fische der Südsee* (1873–1910); *Reptiles and Batrachians of Central America* (1885–1902).

GÜNTHER, ANTON (1783–1863). A Catholic theologian and philosopher. He was born Nov. 17, 1783, at Lindenau in Bohemia. He studied law at Prague, but later took orders, became a priest in 1820, and after 1824 lived in Vienna, where he died Feb. 24, 1863. His studies were directed to reconstructing Catholic dogmatics as a rational science, aiming to settle the ancient strife between reason and religion. Inasmuch as all his attempts to reach this goal by means of pure reason resulted in pantheism, which he saw to be irreconcilable with the doctrines of his church, he sought to solve his difficulties by an appeal to inner experience and self-consciousness. Thus gradually arose his theologicospeculative system first presented in his *Vorschule zur spekulativen Theologie des positiven Christentums* (1828). In his *Der letzte Symboliker* (1834) the Tübingen positions are attacked. By these and similar works Günther gained numerous adherents, whose "Young Catholicism" spread through Germany and Austria. He turned from the scholastic methods and attempted to use the philosophy of Hegel and Shelling, and his work called forth a large controversial literature in the Catholic church. Günther received and declined a call to the University of Munich, preferring to remain a priest, although his collected works were put on the *Index Librorum Prohibitorum* in 1853. His collected works appeared in Vienna in 1882. For his life, consult Knoodt (Vienna, 1881).

GÜNTHER, JOHANN CHRISTIAN (1695–1723). A German lyric poet, born at Striegau. He was the most gifted poet of an unpoetic generation, but wasted his genius in dissipation. At 22 he won recognition by a poem on the Peace of Passarowitz (1718). His later vagabond lyrics are marked by more sincerity and freedom, cleverness and imagination, than were common in his time, but they were as unconventional in morals as in treatment. His poems to Lenore are among the best lyrics from the time of Walter von der Vogelweide to Goethe, who put Günther among those from whom he got his first lyric inspiration. Günther's poems (1742) are edited by Fulda in Kürschner's *Deutsche Nationallitteratur*, vol. xxxviii by Tittmann (1874), and by Litzmann (in *Reclams Universal-Bibliothek*). Consult: Kalbeck, *Neue Beiträge zur Biographie des Dichters Christian Günther* (Leipzig, 1879); Litzmann, *Zur Textkritik und Biographie Johann Christian Günthers* (Frankfort, 1880); Wittig, *Neue Entdeckungen zur Biographie des Dichters J. Chr. Günther* (Striegau, 1881).

GÜNTHER, JOHANN HEINRICH FRIEDRICH (1794–1858). A German veterinary surgeon, born at Kelbra and educated at Jena and Berlin. He was director of the veterinary college at Hanover from 1847 until his death. From 1821 to 1835 he devoted himself chiefly to the healing of contractures. He adopted the subcutaneous method of operating in 1835 and after 1846 collaborated with his son on dental diseases. Their treatise, entitled *Ueber gesunde und kranke Zähne des Pferdes*, an appendix to *Die Beurteilungslehre des Pferdes* (1859), was the first valuable contribution to the pathology of dental disease in animals. His investigations on veterinary diseases, particularly those on pulmonary affections, are very important. His principal works include: *Lehrbuch der praktischen Veterinärgeburtshilfe* (1830); *Das Gangwerk der Pferde* (1845); *Lupinenbau* (1857).

GÜNTHER, KARL WILHELM ADALBERT (1822–96). A German veterinary surgeon, son of the preceding, born at Hanover and educated there and at Berlin. From 1847 until 1881 he was the principal teacher in the veterinary school at Hanover, where he was appointed professor in 1867 and director in 1870. He was an expert anatomist and one of the best veterinary operators of his time. His works include: *Topographische Myologie des Pferdes* (1866); *Die Wutkrankheit der Hunde* (1880); *Das Kapaunen red Hähne* (1890); *Studien über das Kehlkopfpfeifen der Pferde* (1894).

GÜNTHER, SIEGMUND (1848–). A German mathematician and geographer. He was born in Nuremberg, was educated at Erlangen, Heidelberg, Leipzig, Berlin, and Göttingen, and in 1886 became professor of geography, and later prorector, in the School of Technology in Munich. His contributions to mathematics have been largely historical and geographical, and in these lines they are valuable. They include the following: *Lehrbuch der Determinantentheorie* (1875; 2d ed., 1877); *Vermischte Untersuchungen zur Geschichte der*

mathematischen Wissenschaften (1876); *Der Einfluss der Himmelskörper auf Witterungsverhältnisse* (1876; 2d ed., 1884); *Grundlehren der mathematischen Geographie und Astronomie* (1878; 3d ed., 1893); *Die Lehre von den gewöhnlichen und verallgemeinerten Hyperbelfunktionen* (1881); *Parabolische Logarithmen und parabolische Trigonometrie* (1882); *Lehrbuch der Geophysik und physikalischen Geographie* (1884–85); *Die Meteorologie ihrem neuesten Standpunkt gemäss dargestellt* (1889); *Handbuch der mathematischen Geographie* (1890); *Lehrbuch der physikalischen Geographie* (1891); *Das geschichtliche Element beim Mathematischen Unterricht* (1893).

GÜNTHER VON ANDERNACH, fôn än′dẽr-näg, Johann (1487–1574). A German physician, born in Andernach, Rhenish Prussia. He was educated at Utrecht and Marburg, became professor of Greek at Louvain, and subsequently took his doctorate in medicine at Paris. There he became physician to Francis I. Obliged, as a Protestant, to flee the city, he established himself at Strassburg, where he achieved distinction as a physician and anatomist. His published works include *Anatomicarum Institutionum Libri Quattuor* (1536).

GUN′TON, George (1845–). An American social economist, editor, and author. He was born in Cambridgeshire, England, emigrated to the United States in 1874, and was active from 1874 to 1880 as a writer on economic and allied topics. Subsequently he was connected with economic, sociological, and scientific work, and in 1890 became president of the Institute of Social Economics. From 1890 he was also editor of the *Social Economist*, the name of which was changed in 1896 to *Gunton's Magazine.* In 1899 he was appointed director of the economic and sociological work of the Young Men's Christian Association in North America. His publications include: *Wealth and Progress* (1887; 7th ed., 1897); *Principles of Social Economics* (1891); *Trusts and the Public* (1899); *Outlines of Social Economics* (1900).

GUNTRAM, gụn′trȧm. An opera by Richard Strauss (q.v.), first produced at Weimar, May 10, 1894.

GURA, go͞o′rȧ, Eugen (1842–1906). A German barytone singer. He was born at Pressern, Bohemia, and after studying music at Munich, made his first appearance at the Court Theatre in that city in the rôle of Count Liebenau, in Lortzing's opera *Der Waffenschmied.* He subsequently sang at Breslau, Leipzig, Hamburg, and London, and was a member of the Munich Opera from 1883 to 1902, when he retired. Although at first excelling in rôles such as Nelusco, Tell, the Templar, he subsequently devoted himself more exclusively to the interpretation of Wagnerian parts. He was equally famous as a concert singer. His autobiography, *Erinnerungen aus meinem Leben*, was published in Leipzig in 1906.

GURAMAI, go͞o-rä′mī. See Gourami.

GUR′JUN (East Indian name) **BALSAM,** Gurjun Oil, or Wood Oil. A limpid, dark-brown balsamic liquid, obtained from the gurjun tree, growing on the Burma coast, East India. It is used medicinally for checking leprosy and sometimes as a substitute for copaiba. In the arts it is chiefly employed as a varnish for ships. It may be distinguished from the balsam of copaiba by applying heat: at 132° C. (270° F.), gurjun balsam coagulates, while copaiba remains liquid.

GURKHAS, GHURKAS, GOORKHAS, or **GHOORKHAS,** go͞or′kaz (from Skt. *gōrakṣa*, cowherd, from *gāu*, cow + *rakṣa*, guard, from *rakṣ*, to protect). A Hindu race of supposed Rajput origin, inhabiting Nepal, a state situated on the southern slope of the Himalayas, between Tibet and British India, which they first invaded about the twelfth century A.D., and where they have been permanently settled since the latter half of the eighteenth century. An attempt to extend their power farther south brought them into conflict with the British in the Gurkha War of 1814, which ended in the Treaty of Segauli and clearly defined their territorial limits. They now supply the Indian Empire with a corps of infantry renowned for its loyalty and bravery. Their war record began with the Indian Mutiny in 1857, during which they remained loyal and rendered invaluable service to the British. In 1900 they formed part of the British contingent in the international campaign in China, and in the European War of 1914 they were conspicuous for their daring and bravery. (See War in Europe.) In physique the Gurkha is very short and stout; a natural infantryman and an instinctive foe of cavalry, whose horses he is an adept at hamstringing. In addition to the ordinary equipment of the native soldier, he carries a knife, called the *Kukri*, peculiar to his race, and which at close quarters he uses in preference to the bayonet. The Gurkha troops form 20 battalions of the native army in India, numbering about 20,000, and are greatly valued by the British government. See Nepal.

GURKO, go͞or′kô, Ossip Vladimirovitch (1828–1901). A Russian general. He entered the army as cornet of the Hussars of the Imperial Guard in 1846, was made a captain in 1852, and in this capacity served in the Crimean War (q.v.). In 1857 he was assigned to the command of his old regiment of the Guards and in 1860 was made an aid-de-camp of the Emperor. His next promotion was to a colonelcy (1861), in which capacity he served in the campaign of Poland in 1863. In 1867 he was a major general in the suite of the Emperor and assigned to the command of a brigade in the second cavalry division of the Guards. In 1876 he was given the command of the same division. At the opening of the war with Turkey he led the Russian advance across the Danube and occupied Tirnova, July 7, 1877. At the head of a large force, composed chiefly of cavalry, Gurko passed the Balkans, moved rapidly on Adrianople, advancing within two days' march of that city. He was, however, defeated by Suleiman Pasha at Eski-zagra and compelled to fall back to the Shipka Pass, which he held against repeated attacks. In December he advanced again across the Balkans and occupied Sophia, Jan. 4, 1878. He defeated Suleiman Pasha in a three days' battle near Philippopolis, Jan. 15–17. In 1879 he became Governor-General of St. Petersburg, but was removed in the following year because he had failed to protect the Czar sufficiently against an attempt on his life, even going so far as pardoning some Nihilistic conspirators. In 1882 he was Governor of Odessa. From 1883 to 1894 he was Governor-General of Poland, retiring in the latter year with the title of field marshal. He died Jan. 28, 1901.

GUR'LEY, Ralph Randolph (1797–1872). An American philanthropist. He was born in Lebanon, Conn., and graduated at Yale in 1818. Beginning in 1822, he was for half a century agent and secretary for the American Colonization Society. He visited Africa three times in the interest of the negroes and aided in establishing Liberia. He edited the *African Repository* and published a *Life of Jehude Ashmun* (1839) and *Life and Eloquence of Rev. Sylvester Larned* (1844).

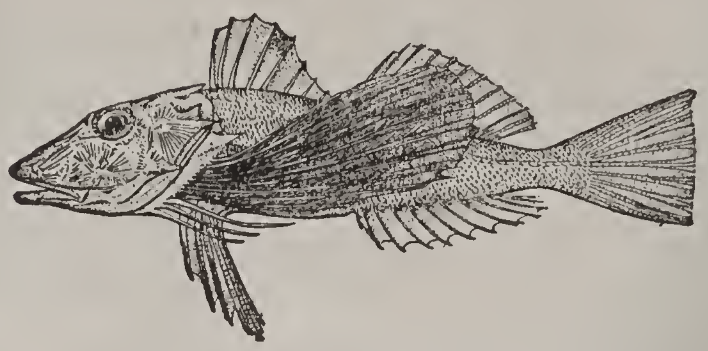
GURLITT, gụr'lĭt, Cornelius (1820–1901). A German composer. He was born at Altona, near Hamburg, and studied under the elder Reinecke (composition) and subsequently with Weyse at Copenhagen. In 1864 he became organist of the Altona Hauptkirche and during the Schleswig-Holstein campaign was appointed army musical director, after which he became a member of the faculty of the Hamburg Conservatory. In 1874 he was appointed royal musical director. His compositions include several operas and operettas, string quartets, violin sonatas, cello sonatas, vocal duets, and songs. His operas had but a local significance, and while his string compositions are more generally known, his claim to fame will rest on his pianoforte compositions, and particularly on his instructive pieces, which are used throughout the civilized world.

GURLT, gụrlt, Ernst Friedrich (1794–1882). A German veterinary surgeon, born at Drentkau, near Grünberg, Silesia, and educated at Breslau. He was professor of the School of Veterinary Surgery at Berlin from 1826 to 1870, and also director of the technical department of that institution during the last 20 years of his life. He may be said to have been the founder of that branch of anatomical science which treats of the organic structure of the domestic animals, and his investigations on animal deformities are especially noteworthy. His principal publications include: *Handbuch der vergleichenden Anatomie der Haussäugetiere* (1821; 7th ed., 1890); *Lehrbuch der pathologischen Anatomie der Haussäugetiere* (with 35 plates, 1831–32, with supplement, 1849); *Lehrbuch der vergleichenden Physiologie der Haussäugetiere* (1837; 3d ed., 1865); *Anatomy of the Horse* (Eng. trans. by J. Willimott, 35 plates, 1833).

GURLT, Ernst Julius (1825–99). A German surgeon, son of Ernst Friedrich Gurlt, born in Berlin. He was appointed professor at the university in that city in 1862. From 1867 to 1898 he was editor of the German Red Cross periodical, *Kriegerheil,* and he also edited the *Biographische Lexikon der hervorragenden Aertze aller Zeiten und Völker* (6 vols., 1884–88). His writings on medical statistics are especially valuable. His principal publications include: *Handbuch der Lehre von den Knochenbrüchen* (2 vols., 1862–64); *Leitfaden für Operationsübungen am Kadaver* (1862; 7th ed., 1889); *Zur Geschichte der internationalen und freiwilligen Krankenpflege im Krieg* (1873); *Die Gelenkresektionen nach Schussverletzungen* (1879); *Geschichte der Chirurgie und ihre Ausübung* (3 vols., 1898).

GUR'NAH. See Kurnah.

GUR'NARD (connected with OF. *gournauld, gournant, grougnant,* from *grognard,* grunter, from *grongner,* Fr. *grogner,* to grunt; so called in allusion to the sound made by the fish when taken from the water). Any of the marine spiny-rayed fishes of the family Triglidæ. The head in the gurnards is angular and wholly covered with bony plates; the body is elongated, nearly round, and tapering. There are two dorsal fins. The lower three rays of the large pectoral fins are detached and elongated into long feelers, which are used mainly in search for food. Many gurnards are distinguished for their beauty of color. They live on the bottom, some at considerable depths, in which case they have a red color. The red gurnard of the British coast (*Trigla cuculus*) is the most common of many European species, and takes its name, red crooner or cuckoo gurnard, from the note it utters when lifted out of the water; another species is called piper. In the United States these fishes are better known as sea robins. The most common one (*Prionotus carolinus*) is found abundantly on the east coast from Maine to South Carolina. There are many other species. The flying gurnard (*Cephalacanthus volitans*) occurs in the Atlantic on both coasts. (See Flying Fish.) The gurnards are known by various other names, such as batfish and sea swallows. The maximum size is 18 inches. They are regarded as good food fishes in the Old World, in spite of their uncouth appearance, but in the United States are little used as food.



AN AMERICAN GURNARD (*Prionotus carolinus*).

GUR'NEY, Edmund (1847–88). An English philosophical writer, born at Hersham. He graduated from Trinity College, Cambridge, in 1871; then devoted himself to music, especially the violin; and wrote a book called *The Power of Sound* (1880). He studied medicine at University College, London, and at Cambridge, between 1877 and 1880, and law at Lincoln's Inn in 1881–83. Long interested in philosophy and psychical problems, he devoted himself to the work of the Society for Psychical Research (which he had helped to found in 1882), collecting for the society alleged instances of telepathy in the work *Phantasms of the Living* (2 vols., 1886) and contributing largely to the first five volumes of the society's *Proceedings* and to the periodical *Mind.* A collection of his essays was published under the title *Tertium Quid* (2 vols., 1887).

GURNEY, Ephraim Whitman (1829–86). An American educator, born in Boston, Mass. He graduated at Harvard in 1852, was tutor in Latin there from 1859 to 1863, and in 1863–67 assistant professor of Latin. In 1868 he became assistant in history, in 1869 university professor of history, and in 1886 McLean professor of history. He was editor of the *North American Review* from 1868 to 1872 and dean of Harvard from 1870 to 1876. In 1860 he was elected a member of the American Academy of Arts and Sciences. As an academic lecturer, he was exceedingly able.

GURNEY, Sir Goldsworthy (1793–1875).

An English inventor, born in Cornwall. He was probably the first to devise the oxyhydrogen blowpipe and the so-called Drummond, or lime, light, and the first to produce and employ, for purposes of rapid locomotion, the high-pressure steam jet, as well as an ammonia engine, probably the first ever made, which was used in driving a small locomotive. He also devised a system of mechanical power-driven legs, which were tested until found impracticable. In 1827 he built a steam carriage, in which he made a journey of 85 miles in 10 hours. He was knighted in 1863. He published a *Course of Lectures on Chemical Science Delivered at the Surrey Institution* (1823); *Account of the Invention of the Steam-Jet or Blast, and its Application to Steamboats and Locomotive Engines* (1859); and several other works.

GURNEY, Joseph John (1788–1847). An English Quaker, prominent as a philanthropist and reformer. He was born at Earlham Hall, near Norwich, of an ancient and wealthy family, was educated privately at Oxford, and in 1818 became a minister of the Society of Friends. His life was devoted to the prosecution of benevolent enterprises, to many of which he also made liberal gifts. He coöperated with his sister, Mrs. Elizabeth Fry, in prison reforms, and with Clarkson, Wilberforce, and Sir Thomas Fowell Buxton (his brother-in-law) in the advocacy of the abolition of slavery. He made a number of visits to various European countries and to the United States in the interest of the Society of Friends and in the United States spoke frequently in public in favor of the abolition of slavery and capital punishment. Among his numerous works are *Observations on the Distinguishing Views and Practices of the Society of Friends* (1824) and *A Winter in the West Indies Described in Familiar Letters to Henry Clay of Kentucky* (1840). Consult Braithwaite, *Memoirs of Joseph John Gurney* (3d ed., London, 1902), and Mrs. Geldart, *Reminiscences of a Good Man's Life* (1853).

GUROWSKI, gōō-rŏv′skē, Adam, Count (1805–66). A Polish author, long resident in the United States. He was expelled from Polish schools in 1818 and in 1819, for having taken part in revolutionary demonstrations, and subsequently studied in Germany. He returned to Warsaw in 1825, however, and had a share in the insurrection of 1830, after the failure of which he fled to Paris, where he joined the Polish committee. In 1835 he published *La vérité sur la Russie*, a work advocating Panslavism, which was so favorably received in Russia that he was recalled and employed in the Russian civil service, though his confiscated estate was not restored. In consequence of opposition to him at court, he left the country in 1844, studied at Heidelberg, taught at Bern, Switzerland, and in 1849 came to the United States. He was for several years engaged in active literary work and from 1861 to 1863 was employed as a translator in the State Department of Washington. He published: *La civilisation et la Russie* (1840); *Pensées sur l'avenir des Polonais* (1841); *Aus meinem Gedankenbuche* (1843); *Die letzten Ereignisse in den drei Theilen des alten Polens* (1846); *Le Panslavisme* (1848); *Russia As It Is* (1854); *The Turkish Question* (1854); *A Year of the War* (1855); *America and Europe* (1857); *Slavery in History* (1860); and a diary of notes on the Civil War.

GUR′TEEN, Stephen Humphreys Villiers (1840–98). An American Protestant Episcopal clergyman, born at Blean House, near Canterbury, England, and educated at Cambridge and subsequently at Paris and Berlin. He was professor of Latin at Hobart College, held rectorates at Buffalo, N. Y., and at Toledo, Ohio, and was dean of St. Paul's Cathedral, Springfield, Ill. His publications are chiefly devoted to the discussion of English charity organization, which he was instrumental in introducing into the United States. They include: *What Is Charity Organization?* (1879; 4th ed., 1882); *How Paupers Are Made* (1883); *Handbook of Charity Organization* (1882); *Beginnings of Charity Organization in the United States of America* (1894); *The Arthurian Epic* (1895); *The Epic of the Fall of Man* (1896).

GUR′TON, Gammer. See Gammer Gurton's Needle.

GURU, gōō′rōō (Skt., teacher). A spiritual guide or teacher among the Hindus. The title was applied to a religious preceptor from whom a youth received initiatory instruction, and who conducted the necessary ceremonies up to the time when the lad was invested with the sacred cord, as described in detail in Manu and the other law books. The guru not infrequently possesses considerable temporal power, as, e.g., in Nepal (q.v.). Among the Sikhs (q.v.) the guru was at first the spiritual guide, but came in time to be practically the temporal ruler or leader, while the teaching was done by the other priests, who acted as guardians of the sacred books. The followers of Vallabha are required to place at the guru's disposal *man, tan, dhan*, i.e., mind, body, and property.

GURY, gu̇′rē′, Jean Pierre (1801–66). A French Roman Catholic theologian. He was born at Mailleroncourt, and at the age of 23 entered the Society of Jesus. After teaching at various Jesuit colleges he became professor of moral theology at Vals in 1833. His principal works, the *Compendium Theologiæ Moralis* (2 vols., 1850; 4th ed., 1868; Ger. trans., 1869) and *Casus Conscientiæ in Præcipuas Quæstiones Theologiæ Morales* (1864; 8th ed., 1891), gave rise to considerable polemical discussion. They have been frequently republished in France, Germany, and elsewhere, and, reëdited by Ballerins, have also been used as textbooks.

GUSSENBAUER, gu̇′sen-bou′ẽr, Karl (1842–1903). An Austrian surgeon. He was born at Ober-Vellach, Carinthia, and was educated at Vienna, where for some time he was assistant to Billroth. In 1875 he was appointed professor of surgery at Liége, in 1878 he was made professor at Prague, and in 1894 he became professor of surgery in Vienna. He was the first to construct a serviceable artificial larynx. His researches were devoted chiefly to gastrotomy, removal of the larynx, partial intestinal resection, and methods of artificial bone severance. His principal works include: *Die traumatischen Verletzungen* (1880); *Sephthämie, Pyohamie und Pyo-Sephthämie* (1882); *Beitrag zur Extirpation von Beckenknochengeschwülsten* (1891).

GÜSSFELDT, gu̇s′fĕlt, Paul (1840–). A German explorer. He was born in Berlin and was educated in natural history and mathematics at Heidelberg, Berlin, Giessen, and Bonn. When the first expedition was sent out by the

German African Society in 1872, he was chosen its leader. The expedition sailed to the coast of Loango, but was shipwrecked near Freetown, Liberia, Jan. 14, 1873, and lost all its stores and equipments. Although Güssfeldt succeeded in establishing a station on the coast, he was unable to penetrate into the interior and returned to Germany in the summer of 1875. In 1876 he visited Egypt and the Arabian Desert (with Schweinfurth) and afterward explored a portion of the Andes, where he discovered a number of glaciers in lat. 34° 30′ S. He also ascended to the top of the volcano of Maipo and reached almost the summit of Mount Aconcagua, the highest peak of South America. In 1892 he became professor of physical geography in the seminary for Oriental languages in Berlin. Among his principal works are the following: *In den Hochalpen: Erlebnisse aus den Jahren 1859–85* (3d ed., 1893); *Kaiser Wilhelms II Reisen nach Norwegen in den Jahren 1889–92* (2d ed., 1892); *Die Loangoexpedition*, jointly with Falkenstein and Pechuel-Loesche (1879 et seq.).

GUSTAFSON, gus′tȧf-son, Gabriel Adolf (1853–1915). A Scandinavian archæologist, born in Visby, Sweden, and educated at the University of Upsala. In 1881 he became a clerk in the Antiquarian Museum at Upsala, in 1889 director of the antiquarian division of the Bergen Museum, and in 1900 Rygh's successor at the University of Christiania as professor of archæology and director of the Archæological Museum, which he reorganized in its new building. He supervised many important excavations and restored the famous Viking ship found at Oseberg. In 1903 he was elected a member of the Royal Academy. He published *Norges Oldtid* (1906), particularly valuable for its illustrations and reconstructions of Viking remains.

GUSTA′VIA. The capital of Saint Bartholomew (Saint-Barthélemy) (q.v.), a French island of the West Indies. It is on the southwest coast and has a good harbor.

GUSTA′VUS I (Gustavus Vasa) (1496–1560). King of Sweden from 1523 to 1560 and founder of the royal house of Vasa. He was born at Lindholmen, May 12, 1496, and was known in private life as Gustavus Ericsson. The name "Vasa" came into use after his accession to the throne, being derived, it is conjectured, from a black fascine in his arms, which was drawn so that it resembled a vase and was changed to yellow by Gustavus, giving it the appearance of a sheaf. His father, Erik Johansson, had been a Swedish senator and was a patriotic member of the Swedish nobility who followed the Stures in the struggle of the Swedes for independence from Denmark. The young Gustavus began his studies at Upsala in 1509 and five years later entered the service of the Regent Sten Sture, distinguishing himself by gallantry in the battle of Bränkyrka, in which Sture defeated the forces of Christian II of Denmark (1518). After the battle Christian sought an interview with Sture and asked that six hostages be given for his safety. Gustavus was chosen as one of these hostages. As soon as they were on board the Danish ship it sailed away to Denmark, where the hostages were held in captivity. From this captivity Gustavus escaped to Lübeck in 1519 and, returning to Sweden, finally found a refuge among the loyal peasantry of Dalecarlia, for the death of Sture in 1520 had given the country over to the Danes. In Dalecarlia he wandered about for several months in disguise, with a price set on his head. In November, 1520, 90 of the nobles and leaders of Sweden who had been summoned to attend the coronation of Christian II were beheaded. Among them were the father and the brother-in-law of Gustavus. The young fugitive vainly attempted to rouse the inhabitants of Dalecarlia to revolt and was forced to seek refuge in the less frequented parts of the country, where for a month he earned his living as a field laborer and more than once owed his life and safety to the generosity of the peasant women of the district. Not until his account of the tyranny of the Danes was corroborated by the testimony of several fugitives from Stockholm was the national enthusiasm roused, and the peasants of Dalecarlia, at Mora, on Christmas eve, 1520, proclaimed him head of their own and other communes in Sweden. His first victories over the Danes brought recruits in large numbers. He defeated the Danes at Vesterås, took Upsala, and on Aug. 24, 1521, was proclaimed Administrator of the Kingdom of Sweden. In June, 1523, the Swedish Diet at Strengnäs declared the union with Denmark dissolved and proclaimed Gustavus Ericsson King of Sweden. Two weeks later he made his triumphant entry into Stockholm. See Sweden, *History*.

The King early showed his determination to favor the Lutheran doctrines, and, without attempting to force his subjects into an unwilling change of ecclesiastical alliance, he gradually, by patience and tact, established Lutheranism as the religion of the state and placed Sweden unalterably in the ranks of Protestant countries. This was finally accomplished and legalized in the Diet at Vesterås in 1527 and a national council held at Oerebro in 1529. His attitude towards the Reformation was largely influenced by his desire to overthrow the power of the Catholic clergy, which he considered dangerous to the royal authority and the cause of Swedish independence. The problems of government he had to encounter were many. The young King found a country divided into factions, poor, and with almost wholly undeveloped resources, and wasted by barbarous wars. He also felt the lack of good administrative men and advisors. He had to do his own clerical work and was the only one in his Council who could speak German. He devoted himself with fine patience and moderation to the task of developing and reorganizing it. He had owed much to the devotion of the peasantry, while in the proud and turbulent nobility, many of whom belonged to the Danish and Catholic factions, he saw a grave menace to stable government. He therefore sought to give the peasantry better opportunities and fuller participation in the national life and to limit the dangerous power of the nobles. From 1525 to 1542 he was kept busy putting down four formidable rebellions. He was a practical business man as well as a large-minded statesman, and he fostered the commerce, mining, and fisheries of the kingdom with the most careful personal attention, even as to details. Land was reclaimed, hydraulic works were constructed, and saw mills built. The reforms in the state were not accomplished without great difficulties. The King had to meet disaffection and revolt; he carried on war with Lübeck and the Hansa towns.

After 40 years' rule Gustavus left Sweden a peaceful and civilized realm, with a full exchequer, a well-organized army of 15,000 men, and a good fleet. He made commercial treaties with foreign nations and established fairs for foreign traders. Roads and bridges were made in every part of the country, and canals begun. In his relations with his subjects Gustavus was firm and sometimes severe, but seldom unjust, except in his dealings with the Catholic clergy, whom he despoiled of all their lands and funds. He did much to promote the cause of Lutheranism, although he took care that the Reformed clergy should be dependent on the crown and enjoy only very moderate emoluments. He was three times married and had 11 children. By an act (reënacted in 1860) of the Diet of 1544, at Vesterås, the crown was declared hereditary in the male descendants of Gustavus; in conformity with which, his eldest son, Eric (see ERIC XIV), succeeded to the throne on his father's death, Sept. 29, 1560. Consult: Geijer, *Geschichte Schwedens*, vol. ii (Hamburg, 1834); Watson, *The Swedish Revolution under Gustavus Vasa* (Boston, 1889), which contains a good bibliography; Bain, *Scandinavia* (Cambridge, 1905).

GUSTAVUS II (GUSTAVUS ADOLPHUS) (1594–1632). King of Sweden from 1611 to 1632, and one of the greatest generals of modern times. He was born Dec. 9, 1594, and was the grandson of Gustavus Vasa, by his youngest son, Charles IX, at whose death in 1611 he succeeded to the throne. Gustavus was brought up in the Lutheran faith, carefully trained in habits of business, and was one of the most accomplished princes of his age. He was educated under the care of John Skytte, a traveled and accomplished Swede, Von Morner, a German, and James de la Gardie, a Swedish noble of French origin. On his accession to power he found the country involved in wars with Denmark, Russia, and Poland. Two months after his accession Gustavus was declared of age by the Estates, and the regency was dissolved. The young man found it necessary to wrest a large part of southern Sweden from the Danes and to thwart the designs of Sigismund of Poland upon the Swedish crown. To strengthen Sweden for the struggles which this involved, the young King, with the approval of the great Chancellor, Axel Oxenstierna (q.v.), believing that the time had come for a halt in the policy of repression of the nobility, which his father and grandfather had found necessary for the authority of the crown, sought to secure the hearty coöperation of the nobles, whose privileges he confirmed, holding them in return strictly accountable for loyal service. He sought to unite the classes—nobles, clergy, burghers, and peasants—in a common purpose, the upholding of Swedish power. While reorganizing the internal government, the King entered upon a war with Denmark, which ended in January, 1613, with the relinquishment of some Swedish districts of Denmark. Gustavus had a clear appreciation of the importance of Russia and of the possible menace to Sweden in Russian aggrandizement, and therefore, after disposing of Denmark, he opened a victorious campaign against Russia. By the Peace of Stolbova, Feb. 27, 1617, Russia ceded to Sweden Ingria and Carelia. The boundary of the Swedish territory then included the site of the future St. Petersburg. The Russian war was but a prelude to that against Poland in which, during eight years of active campaigning (1621–29), Gustavus developed his innovations in the art of war, trained the Swedish armies, which became noted as the best troops of Europe, and brought out that brilliant body of commanders who followed him in his later campaigns and carried out his policy after his death. Gustavus conquered all of Livonia and Courland, and occupied the Duchy of East Prussia, held by Brandenburg as a fief of the Polish crown. The war against Poland was to prevent the aggrandizement of Sigismund and to compel his recognition of Gustavus as King of Sweden. In a larger sense it was a defensive war, since the ultra-Catholic powers—Spain and the Empire—had schemed to use Sigismund as an instrument against the Protestant "Lion of the North." Largely through the efforts of Richelieu (q.v.), an armistice for six years was arranged (Sept. 16, 1629) on the basis of a full recognition of Gustavus as King of Sweden, and Gustavus was thus left free to take an active part in Germany, where the course of the Thirty Years' War had been steadily against the Protestant princes, and the advance of the Imperialists under Wallenstein (q.v.) was already threatening to establish a new power on the Baltic.

In June, 1630, Gustavus, with an army of about 13,000 men, landed in Germany to aid the Protestants in their struggle against the Catholic League, backed by the power of the Empire. The Swedes soon drove the Imperialists from Pomerania. France, through hatred of the Empire, agreed to furnish Gustavus with a subsidy of 400,000 rix-dollars as long as he maintained an army of 36,000 men. The Protestant Electors of Brandenburg and Saxony, jealous of this new power in Germany, were little inclined to coöperate with Gustavus, but were forced to join the Swedes. On Sept. 17, 1631, Gustavus completely defeated the Imperialists under Tilly at Breitenfeld, near Leipzig, saving the cause of Protestantism just when it seemed threatened with utter destruction. The King now advanced into Franconia, and after allowing his armies to recruit their strength in the rich bishoprics of Würzburg and Bamberg, overran the Palatinate and held a splendid court at Mainz, surrounded by princes and ambassadors. Thence he advanced into Swabia. On April 15, 1632, in the face of Tilly's army, he forced the passage of the Lech, where Tilly was mortally wounded. The road to Vienna was now open to Gustavus, and the Emperor Ferdinand II in terror recalled his general Wallenstein (q.v.), who gathered a large army and advanced to meet Gustavus. The two great commanders confronted each other for a time at Nuremberg, before which town Wallenstein occupied an intrenched position, from which Gustavus, who held Nuremberg, attempted in vain to dislodge him. Then the armies moved northward and met at Lützen, southwest of Leipzig. Here, on Nov. 16, 1632, Gustavus fought his last battle. The Swedes won the day, but in the course of the fighting Gustavus fell, mortally wounded. Bernhard of Weimar (q.v.) succeeded to the command of the Swedish army.

Although Gustavus was eminently a warlike king, he made many salutary changes in the internal administration of his country and devoted his short intervals of peace to the promotion of commerce and manufactures. He was preëminently religious, and his success in battle is perhaps to be ascribed not only to a better mode of warfare and the stricter discipline which he enforced, but also still more to the moral influence which his deep-seated piety and his personal character inspired among his soldiers. The spot where he fell on the field of Lützen was long marked by the Shwedenstein, or Swede's Stone, erected by his servant, Jacob Ericsson, on the night after the battle. Its place has now been taken by a noble monument erected to his memory by the German people on the celebration of the second centenary of the battle, held in 1832. He raised Sweden to a commanding position as the great power of the North, which she retained for a century, and his brief and brilliant campaign saved the cause of Protestantism in Germany. He was succeeded by his daughter Christina.

Bibliography. Of especial value for the history of Gustavus Adolphus is the third volume of Geijer's standard *Sveriges Historia*, in the German translation *Geschichte Schwedens* (Hamburg, 1836). Geijer makes much use of contemporary documents, including the correspondence of the King. Consult also: Droysen, *Gustav Adolf* (Leipzig, 1879), a valuable study by one of the foremost German scholars; Gfrörer, *Geschichte Gustav Adolfs, Königs von Schweden und seiner Zeit* (ib., 1869), a Catholic presentation; in English, Stevens, *History of Gustavus Adolphus* (New York, 1885), the work of a former United States Minister to Sweden and an interesting product of studies pursued under most favorable conditions; Fletcher, *Gustavus Adolphus* (New York, 1890), in the "Heroes of the Nations Series"; Dodge, *Gustavus Adolphus* (Boston, 1895), a study especially on the military side; G. Egelhaaf, *Gustav Adolf in Deutschland 1630–1632* (Berlin, 1901); Hon. E. Noel, *Gustaf Adolf, King of Sweden* (London, 1905); C. H. L. Johnston, *Famous Cavalry Leaders* (New York, 1908). See Thirty Years' War.

GUSTAVUS III (1746–92). King of Sweden from 1771 to 1792. He was born Jan. 24, 1746, and succeeded his father, Adolphus Frederick (q.v.), in 1771, at a period when the royal power had almost disappeared before the encroachments of the nobility, and the country was distracted by the strife of the rival political parties known as the "Hats" and "Caps." (See Caps and Hats.) Finding that the people, weary of the misrule of the nobles, were ready for any change, Gustavus covertly fomented the general discontent, and having raised a fictitious rebellion, through the agency of his friends and adherents, he collected a large body of troops on pretense of restoring order, and arrested the Council in a body, Aug. 19, 1772. He convoked the Diet, and laid before it a new constitution to which the Assembly was compelled to subscribe. A revolution was thus effected without the shedding of blood, and by a stroke of the pen Gustavus recovered all the regal powers that had been gradually lost by his immediate predecessors. He acted with great moderation after this successful coup d'état and might have long retained the advantages he had gained if his love of display and his wish to emulate the King of France in extravagance and magnificence had not led him into profuse expenditure, which embarrassed the finances; at the same time the introduction of the manners and usages of Versailles in his court irritated the national party, while it undoubtedly tended to demoralize the upper classes. In 1788 he entered upon a war with Russia, when that Empire was engaged in active hostilities against the Turks, but derived no advantage from the contest. In February, 1789, a Diet at Stockholm conferred extensive powers upon the King in the matters of war and of the civil administration. This incensed still further the turbulent nobility, who saw the royal authority thrive at the expense of the privileges of their class. A conspiracy against the King's life was formed, the leaders being Counts Ribbing and Horn and General Pechlin. On the night of March 16, 1792, Gustavus was mortally wounded by their agent, Anckarström (q.v.), at a masked ball in the opera house which he had himself built. The pistol had been loaded with broken shot, which rendered the wound especially painful, and the King suffered the most dreadful agony for 13 days before his death. Gustavus was a man of varied learning, and the author of several dramatic works and poems of considerable merit. His writings have been published in a collective form both in Swedish and French. In 1788 Gustavus deposited certain papers in the library of Upsala, which excited much interest from the fact that they were not to be opened for 50 years after his death. Their publication, which was confided to Geijer (q.v.), disappointed the general expectation, as they were found to consist of historical notes and letters of little value. Consult: Bain, *Gustavus III and his Contemporaries, 1746–92* (London, 1894); L. Stavenow, *Konung Gustaf III* (Berlin, 1901); id., *Geschichte Schwedens, 1718–1772*, translated by C. Koch (Gotha, 1908); N. Erdmann, *Gustaf III* (Stockholm, 1907). See Sweden.

GUSTAVUS IV (Gustavus Adolphus) (1778–1837). King of Sweden from 1792 to 1809. He was the son of Gustavus III and was born Nov. 1, 1778. He succeeded his father on the latter's death, March 29, 1792. He was engaged to the daughter of Catharine II; but the Greek religion of the Russian princess was a bar to their marriage. By his father's will he was to be vested with the actual sovereignty at the age of 18. His uncle, the Duke of Sudermania, acted as regent during his minority. He was crowned King April 3, 1800. Gustavus rashly entered the coalition against Napoleon, and hatred of the Corsican became the guiding influence of his life. The result of his policy was the occupation of Swedish Pomerania by French troops under Marshal Brune, who took Stralsund and Rügen from the Swedes in 1807 and thus deprived them of the last of their German possessions. By this time all the patriotic Swedes had come to the conclusion that the King was insane. The King opened all his ports to English vessels and thereby involved himself in a war with Russia, which was then the ally of France. The scene of these hostilities was Finland, which was invaded and conquered by Russia in 1808, the Swedes being assisted by an English auxiliary force of 10,000 men. This unfortunate war with Russia, which had been excited entirely through the folly of the King, gave rise to so much discontent in Sweden that a conspiracy was set on foot by several officers and nobles, the object of which was to dethrone the unpopular monarch. He was seized in the palace at Stockholm, March 13, 1809, and made a prisoner, and the powers of government were assumed by the Duke of Sudermania. On May 10 the King was formally deposed by the Diet, and the crown forever denied to his descendants. The Duke of Sudermania was chosen King of

Sweden as Charles XIII. After wandering for a time from place to place, Gustavus finally settled at Saint-Gall, Switzerland, where he died, Feb. 7, 1837, in poverty, having refused to accept a pension from Sweden. His body was brought back to Sweden for burial. Consult: *Mémorial du colonel Gustafsson (pseudonym)* (Leipzig, 1829); Kleinschmidt, *Die Irrfahrten Gustavus IV Adolf von Schweden* (ib., 1888); Sophie Elkan, *An Exiled King, Gustaf Adolf IV of Sweden*, translated by E. Koch (2 vols., London, 1913).

GUSTAVUS (GUSTAF) V (Gustavus Adolphus) (1858–). King of Sweden, son of Oscar II and Queen Sophia Wilhelmina. He was born at Drottningholm, studied at the University of Upsala in 1877–78 and 1880, and traveled in most of the countries of Europe in 1878–79. He entered the army in 1875 and became lieutenant general in 1892. In 1881 he married Victoria (1862–), daughter of Frederick William Louis, Grand Duke of Baden; five sons were born—the Crown Prince, Gustavus Adolphus, in 1882. Gustavus was Regent during his father's absence in 1899–1900, and on Dec. 8, 1907, he succeeded to the throne of Sweden. The fear of Russian aggression led in 1914 to a great demonstration, or the yeoman's march to the King, in favor of increased armament. To a mass meeting of 40,000 peasants King Gustaf made a rousing speech, which was enthusiastically applauded. Nevertheless, the King had taken unconstitutional action by favoring a militaristic policy in opposition to his cabinet and by choosing a new cabinet in agreement with his views. These acts roused criticism among the Liberals and Socialists.

GUSTAVUS VASA, vä′sȧ. See Gustavus I (Gustavas Vasa).

GÜSTROW, gụ′strō̇. Capital of the circle of the same name in the Grand Duchy of Mecklenburg-Schwerin, situated on the Nebel, 22 miles south of Rostock (Map: Germany, E 2). Its chief public buildings are the thirteenth-century cathedral of St. Cecilia, restored in 1868; the parish church, dating from the sixteenth century and containing Flemish oil paintings and fine specimens of wood carving; a sixteenth-century castle with many towers; the town hall, and the theatre. Its gymnasium dates from the sixteenth century. Güstrow produces machines and other iron articles, tobacco, lumber, borax, dyes, vehicles, mattresses, dairy goods, bricks, wire rope, soap, sugar, and beer. The trade in grain, wool, butter, and cattle is especially important; an annual wool fair is held. Güstrow was founded in the thirteenth century and was for a long time the residence of different reigning houses. Pop., 1900, 16,882; 1905, 17,161; 1910, 17,805.

GUTENBERG, gōō′t*e*n-bĕrk, Johannes (c.1400–c.1468). The inventor of printing from movable types. He was born at Mainz, of the patrician family of Gensfleisch; the latest investigations tend to fix the date between 1394 and 1399. The name of Gutenberg was taken from a property long supposed to have been brought in by his mother, but discovered by recent researches to have been in the possession of his great-grandfather. The family was expelled from Mainz in 1420 and took refuge in Strassburg, where Gutenberg is found living in 1434, having already acquired some reputation for technical skill. He left Strassburg for Mainz in 1444. Attempts at printing were heard of in various quarters; to carry out his own schemes, Gutenberg in 1450 associated himself with Johannes Fust, a wealthy citizen of Mainz, who supplied the money to set up a press and print the "forty-two-line" Bible. Fust dissolved the partnership in 1455 and, since Gutenberg could not repay his advances, retained possession of the plant, which he improved and used. In this manner, though Gutenberg was known as the inventor throughout the fifteenth century, it was possible to claim the honor for Fust in the sixteenth; but for a century past the Dutch Koster (q.v.) has been the only serious rival of Gutenberg, and the searching investigations carried on in 1900, in connection with the fifth centenary of his birth, have established Gutenberg's claims more firmly than ever.

His commercial success was never large. In 1465 the Archbishop Adolf, of Nassau, gave him a benefice, to which various privileges as well as an income were attached. He died at Mainz towards the end of 1467 or in the beginning of 1468. He has been honored by statues in various German towns, and in 1901 a Gutenberg museum was opened in his native town supported by a society also named after him. Consult: Van der Linde, *Gutenbergs Geschichte und Erdichtung* (Stuttgart, 1878); Börckel, *Gutenberg* (Giessen, 1897); Hessels, *Gutenberg: Was he the Inventor of Printing?* (London, 1882); Meissner and Luther, *Die Erfindung der Buchdruckerkunst* (Bielefeld, 1900); Zedler, *Gutenbergforschungen* (Leipzig, 1901); id., *Die älteste Gutenbergtype*, in the publications of the *Gutenberg-Gesellschaft* (Mainz, 1902).

GUTENBERG BIBLE. See Bible, Curious Editions of.

GUTHE, gōō′t*e*, Hermann (1825–74). A German geographer, born at Andreasberg in the Harz region, and educated at Clausthal (1839–45), Göttingen (1845–47), and Berlin (1847–48), where he was a pupil of Ritter. In 1849 he obtained an appointment as teacher in the Lyceum of Hanover, and subsequently he taught mathematics at the Polytechnic High School of the same city. In 1873 he was appointed to the chair of geography at the Polytechnic Institute, Munich. He died of the cholera. His geographical works include: *Die Lande Braunschweig und Hannover mit Rücksicht auf die Nachbargebiete geographisch dargestellt* (2d ed., 1887; 4th abridged ed., 1890); *Lehrbuch der Geographie für die mittleren und oberen Klassen höherer Bildungsanstalten* (6th ed., 1894 et seq.).

GUTHE, Hermann (1849–). A German Semitic scholar. He was educated at Göttingen, at Erlangen, and (after several years as a private tutor) at Leipzig, where in 1884 he became professor of Old Testament exegesis. In 1881 and 1894 he traveled in Palestine; from 1877 to 1896 he edited the *Zeitschrift*, and from 1897 to 1906 the *Mitteilungen* and *Nachrichten*, of the German Palästina-Verein; and his published work was in the fields of philology and religion and of archæology and topography, the more important titles being: *Ausgrabungen bei Jerusalem* (1883); *Palästina in Bild und Wort* (1883–84), with George Ebers; *Das Zukunftsbild Jesaias* (1885); some of the minor prophets in Kautzsch's translation of the Old Testament; a metrical version of Amos (1907), with Eduard Sievers; *Palästina* (1908); *Bibel-Atlas* (1911); *Geschichte des Volkes Israel* (3d ed., 1912).

GUTHE, Karl Eugen (1866–1915). An American physicist. He was born at Hanover, Germany, and was educated at the Hanover Technical School and at the universities of Strassburg, Berlin, and Marburg. Removing to the United States in 1892, he taught physics at the University of Michigan, where, after four years as professor at Iowa State College, he became professor in 1909 and dean of the Graduate Department in 1912. He was a member of the jury of awards at the St. Louis Exposition in 1904 and was vice president of the American Association for the Advancement of Science in 1908. He is author of a *Manual of Physical Measurements* (1902; 3d ed., 1912), with J. O. Reed; *Laboratory Exercises with Primary and Storage Cells* (1903); *Textbook of Physics* (1908; 2d ed., 1909); *College Physics* (1911), with J. O. Reed; *Definitions in Physics* (1913); and contributions on physics and electricity in scientific journals.

GUTH′RIE, gŭth′rĭ. A city, until 1911 the capital, of Oklahoma, and the seat of Logan County, 31 miles by rail north of Oklahoma City, on Cottonwood and Cimarron rivers, and on the Atchison, Topeka, and Santa Fe, the Chicago, Rock Island, and Pacific, the Missouri, Kansas, and Texas, the St. Louis, El Reno, and Western, and the Fort Smith and Western railroads (Map: Oklahoma, D 3). It was founded in 1889, when the Territory was opened for settlement, and became the capital in 1890. Later occurred a spirited contest between Guthrie and Oklahoma City (q.v.), the rival cities both developing rapidly. Because of its fine climate and mineral waters with medicinal properties recently discovered, Guthrie has become popular as a health resort. Among its industrial establishments are cottonseed-oil and flouring mills, foundries, railway and machine shops, broom works, cotton compress, and cotton mills. The principal buildings include the Scottish Rite Temple, Carnegie library, the city hall, county courthouse, large municipal bathhouse, the Oklahoma University (Methodist Episcopal), Methodist Hospital, Guthrie Hospital, high school, and a Federal building costing $250,000. Guthrie has adopted the commission form of government. The city owns and operates its water works. Pop., 1890, 5333; 1900, 10,006; 1910, 11,654; 1914 (U. S. est.), 11,911.

GUTHRIE, Charles Claude (1880–). An American physiologist. He was born at Gilmore, St. Charles Co., Mo., and graduated (M.D.) from the University of Missouri in 1901 and (Ph.D.) from the University of Chicago in 1908; taught physiology while engaged in advanced studies, and was professor of physiology and pharmacology at Washington University in 1906–09 and at the University of Pittsburgh after 1909. He is author of *Blood-Vessel Surgery and its Applications* (1912) and of contributions on blood reactions and alterations, resuscitation, cerebral and other anæmias, isolated and engrafted tissues, and sutures and anastomosis of blood vessels.

GUTHRIE, Frederick (1833–86). An English physicist. He was born at Bayswater, London, and was there educated at University School and College. He then studied chemistry at Heidelberg and at Marburg, where he received the degree of Ph.D. He subsequently occupied positions at Owens College, Manchester, University of Edinburgh, and the Royal College, Mauritius. In 1869 Guthrie became connected with the Normal School of Science at South Kensington and lectured there until his death. His early experimental work was for the most part in chemistry, but later he took up physics, and two of his first papers in this field were on “Drops” and “Bubbles.” In 1870 he discovered the phenomenon of the attraction of a vibrating tuning fork for a light suspended body near by, known as “Approach Caused by Vibration,” and later investigated the thermal conductivity of liquids, stationary vibration of liquids in various shaped vessels, electrolysis, solution, and melting points. Guthrie was elected a fellow of the Royal Society of Edinburgh in 1859, and of the Royal Society of London in 1873, in which year he founded the Physical Society of London, whose president he became in 1884. His efforts in promoting and improving elementary science teaching were most successful, and he devised many simple methods and considerable apparatus for teachers which came into extended use in schools. He was an experimentalist rather than a mathematical physicist and was thoroughly practical in his teaching and investigations; he was also a student of the modern languages and a man of letters, having published, under the pseudonym of Frederick Cerny, a poem entitled *The Jew* (1863); *Elements of Heat and Non-Metallic Chemistry* (1868); *Magnetism and Electricity* (1875); *Introduction to Physics* (1877); and the *First Book of Knowledge* (1881).

GUTHRIE, George James (1785–1856). An English surgeon, born in London of Scottish parents. He was admitted to membership in the Royal College of Surgeons in 1801. As army surgeon, he served in the Peninsular campaign, and his work there won the praise of the Duke of Wellington. In 1816 he began a series of lectures in surgery to the officers of the army and navy, which he continued for nearly 30 years. In 1824 he became a member of the council of the Royal College of Surgeons, of which he was three times president, and also professor in 1828–31. His principal works are: *On Gunshot Wounds of the Extremities Requiring the Different Operations of Amputation, and their After Treatment* (1814; 6th ed., 1855); *Lectures on the Operative Surgery of the Eye* (1823; 3d ed., 1838); *On the Anatomy and Diseases of the Urinary and Sexual Organs* (3d ed., 1843).

GUTHRIE, George Wilkins (1848–). An American publicist and diplomat, born in Pittsburgh, Pa. He graduated from the Western University of Pennsylvania (now University of Pittsburgh) in 1866, and from the law department of Columbian (now George Washington) University in 1869. After 1869 he practiced law at Pittsburgh, where he was candidate for mayor on the reform ticket in 1896 and was mayor in 1906–09. He was associate counsel for the Tilden electors in 1876, was active in the work of the National Municipal League, and was candidate for Lieutenant Governor of Pennsylvania in 1902. In 1913 President Wilson appointed him United States Ambassador to Japan.

GUTHRIE, James (1792–1869). An American lawyer and politician, born near Bardstown, Ky., and educated at the academy in that town. He was engaged in the Mississippi River trade for several years, during which he made a number of trips down the river to New Orleans on flatboats, returning to Kentucky each time on horseback. He then studied and began practicing law at Bardstown, and removed to Louisville in 1820, on receiving his appointment as commonwealth's attorney. For 15 years consecutively he served as a member of the State Legislature, for the last six years being a member of the Senate. In 1849 he was president of the State Constitutional Convention, and from 1853 to 1857 was Secretary of the Treasury in the cabinet of President Franklin Pierce. In 1860 he became president of the Louisville and Nashville Railroad. In 1860 he was a candidate for the presidential nomination at the Democratic National Convention at Charleston, S. C., but when the Secession movement began he took his stand as a stanch friend of the Union and contributed much towards keeping Kentucky in the Union. He was a delegate to the Chicago Democratic Convention in 1864, and from 1865 to 1868, when ill health compelled him to resign, was a member of the United States Senate. In 1866 he was a delegate to the National Union Convention at Philadelphia.

GUTHRIE, Sir James (1859–). A Scottish genre and portrait painter, the chief leader of the Glasgow school. He was born at Greenock, near Edinburgh, the son of an eminent divine. After attending the University of Glasgow he studied painting, first at Edinburgh, and later in London under John Pettie, but his trend towards realism evinced his sympathy in other directions, and he learned most from independent study of nature. Mingling in the artistic life of Paris, he first attained recognition abroad, receiving awards at the Salons at Munich, and at Berlin. He was elected member of the Royal Scottish Academy in 1892 and its president in 1902, knighthood following; a member of the Société Nationale des Beaux-Arts; and honorary member of the royal academies of London, Dresden, and Munich. At first a painter of outdoor genre scenes, after 1890 he devoted himself chiefly to portraiture. Important among Guthrie's works are: "Mid-Summer," in the Edinburgh Museum; "A Burial in the Scottish Highlands" and two portraits, in the Glasgow Gallery; "Schoolmates," in the Ghent Gallery; and "Charles Barrie," in the Museum of Victoria, Australia. In America he is known chiefly through his contributions to the exhibitions of the Carnegie Institute, Pittsburgh. Probably the most able member of the Glasgow school, Guthrie is to be ranked in the forefront of British art in the early twentieth century. Eschewing the anecdote, he built his dignified art upon qualities chiefly of color, in which the influence of the Impressionists and of Whistler may be noted. Consult Martin, *The Glasgow School of Painting* (London, 1897), and Caw, *Scottish Painting, Past and Present* (Edinburgh, 1908).

GUTHRIE, Samuel (1782–1848). An American chemist, born at Brimfield, Mass. He studied medicine under his father, and later attended the University of Pennsylvania. During the War of 1812 he was an examining surgeon in the army. He was the first to produce percussion powder successfully and in 1831 discovered "chloric ether," or chloroform (q.v.). His other inventions include the punch-lock, which superseded the flintlock, musket; and a process for rapid conversion of potato starch into sugar. Consult *Silliman's American Journal of Science and Art*, ii (New Haven, 1831–32).

GUTHRIE, Thomas (1803–73). An eminent Scottish pulpit orator and philanthropist. He was born July 12, 1803, at Brechin, Forfarshire, where his father was a merchant and banker. He went through the curriculum for the ministry at the University of Edinburgh and devoted two additional winters to the study of chemistry, natural history, and anatomy. Meanwhile he was licensed as a preacher by the Presbytery of Brechin in 1825. He subsequently spent six months in Paris, studying comparative anatomy, chemistry, and natural philosophy. Returning to Scotland, for two years he conducted the affairs of a bank agency in Brechin. In 1830 he became minister of Arbirlot, in his native county, and in 1837 was appointed one of the ministers of Old Greyfriars Parish in Edinburgh. In 1843 Guthrie joined the Free church and for years ministered to the large congregation of Free St. John's in Edinburgh. In 1847 he advocated ragged schools (q.v.), the first of which he himself established. He also earnestly exerted himself in many ways in opposition to intemperance and other prevailing vices. He retired from the ministry in 1864, and from that time until his death he was editor of the *Sunday Magazine*. Guthrie possessed great rhetorical talent, and his style abounded in illustrations. Of his many works, the most important are: *The Way to Life* (1862); *A Plea for Drunkards and against Drunkenness*, a pamphlet (1851); *A Plea for Ragged Schools*, a pamphlet (1847); followed by a second and a third plea (1848 and 1849), the latter with the former republished under the title of *Seed-Time and Harvest of Ragged Schools* (1860); *The City: Its Sins and Sorrows* (1857). His *Autobiography and Memoir* was published by his sons (London, 1874–75). For his life, consult Smeaton (London, 1900), and Brastow, *Representative Modern Preachers* (New York, 1904).

GUTHRIE, Thomas Anstey (1856–). An English author (pseudonym, F. Anstey), born at Kensington. After graduating at Cambridge, he was called to the bar in 1880. His works include: *Vice Versa* (1882), which was successfully dramatized: *The Black Poodle* (1884); *The Tinted Venus* (1885); *The Fallen Idol* (1886); *The Pariah* (1889); *The Traveling Companions* (1892); *Under the Rose* (1894); *Lyre and Lancet* (1895); and *Paleface and Redskin* (1898, 1912). *The Brass Bottle* (1900), subsequently dramatized, *Baboo Jabberjee B.A.* (1897), and *A Bayard from Bengal* (1902) are humorous yet truthful studies of the East Indian with a veneer of English civilization. Later books are *Only Toys* (1903) and *Salted Almonds* (1906).

GUTHRIE, William Dameron (1859–). An American lawyer and educator. He was born in San Francisco, Cal., and was educated in Paris, in England, and at the Columbia Law School (1879–80). In his practice before the United States Supreme Court he argued the income tax, California irrigation, Illinois inheritance tax, oleomargarine, and Kansas City stockyards rate cases. He was Storrs lecturer at Yale University in 1907–08 and became Ruggles professor of constitutional law at Columbia University. Besides his contributions to periodicals on legal and political subjects, he is author of *Lectures on the Fourteenth Amendment to the Constitution* (1898) and *Introduction to American Constitutional Law* (1913).

GUTI, and **GUTIAN DYNASTY.** See Babylonia.

GUTIÉRREZ, A. García. See García-Gutiérrez.

GUTIÉRREZ, gōō-tyâr′rās, SANTOS (1820–72). A Colombian soldier and politician, born in Cocui, State of Boyacá. Having studied law, he entered practice in 1839. He successively filled a number of judicial, civil, and military positions, both provincial and national. Of Liberal views, he combated the dictatorship of Melo in 1854, and in the revolution of the Liberals, in 1859–63, he was one of the leading generals, winning a number of important battles. He then served as a member of the national Congress, Governor of Boyacá, national senator, and Minister of Foreign Relations. After the deposition of President Mosquera, in 1868, Gutiérrez was elected President for a term of two years, at the close of which he retired to private life.

GUTIÉRREZ DE LA CONCHA, JOSÉ, MARQUÉS DE LA HABANA. See CONCHA, JOSÉ GUTIÉRREZ DE LA, MARQUÉS DE LA HABANA.

GUTIÉRREZ DE LA CONCHA, MANUEL, MARQUÉS DEL DUERO. See CONCHA, MANUEL GUTIÉRREZ DE LA, MARQUÉS DEL DUERO.

GUT MANUFACTURE. See CATGUT; GOLDBEATER'S SKIN.

GUTNIC, gōōt′nĭk, or **GUTNISH.** The dialect of the island of Gotland in the Baltic, forming, with Swedish and Danish, the philological group known as East Norse. It is preserved in runic inscriptions extending from the seventh to the sixteenth century and also in several fourteenth-century manuscripts.

GUTSCHMID, gōōt′shmĭt, ALFRED VON (1831–87). A German historian, born at Loschwitz, near Dresden. He was educated at Leipzig and Bonn and held the chair of history at the universities of Kiel, Königsberg, Jena, and Tübingen. His writings, mostly on the history of Greece and Persia and on ancient chronology and annalism, include *Untersuchungen über die Geschichte des Königreichs Osroëne* (1887) and *Geschichte Irans und seiner Nachbarländer von Alexander dem Grossen bis zum Untergang der Arsaciden* (1888).

GUTSMUTHS (written GUTSMUTHS), gōōts′mōōts, JOHANN CHRISTOPH FRIEDRICH (1759–1839). A German pedagogue and author of the first modern manuals of physical education. He was born at Quedlinburg and after three years in the University of Halle became preceptor in the parental home of the renowned geographer Karl Ritter, upon whose development GutsMuths exercised a powerful influence. He subsequently became instructor in various branches, but more especially in geography, the French language, and gymnastics, in Salzmann's newly established educational institution at Schnepfenthal, where he remained from 1785 until his death. Besides his activities in the field of physical education, he did much to systematize the study of geography and to make it interesting. His most important books were *Gymnastik für die Jugend*, the first modern handbook of gymnastics (1793; 2d ed., much changed, 1804), and *Spiele zur Uebung und Erholung des Körpers und Geistes* (1796). Reprints, translations, or abridgments of the former, or compilations based upon it, appeared in Denmark, Sweden, Holland, France, Austria, Italy, Greece, England, and the United States. In the English translation the work is attributed to Salzmann! Besides other books on gymnastics, swimming, and mechanical avocations (manual training), he wrote numerous books devoted to geography and edited and published the *Bibliothek der pädagogischen Litteratur* (1800–20).

GUT′TÆ (Lat., drops). Pendent ornaments attached to the underside of the mutules (q.v.) and to the *regulæ* under the triglyphs (q.v.) of the Doric order. (See COLUMN.) They are in the form of the frustum of a cone or are cylindrical. They are obviously a reminiscence in stone of pegs or nails, which had a practical purpose in the wood and clay structures from which the Doric style was developed, but in the stone buildings have become merely ornamental.

GUT′TA-PER′CHA (Malay *gatah*, gum + *percha*, name of a tree). A substance in many respects similar to caoutchouc and consisting of the dried milky juice of certain trees and climbers, the best being obtained from the Isonandra gutta, which is found in the Peninsula of Malacca, the Malayan Archipelago, and the Philippines. The tree belongs to the natural order Sapotaceæ. It is a very large tree, the trunk being sometimes 3 feet in diameter, although it is of little use as a timber tree, the wood being spongy. The leaves are alternate, on long stalks, obovate oblong, entire, somewhat leathery, green above, and of a golden color beneath. The flowers are in little tufts in the axils of the leaves, small, each on a distinct stalk, the corolla having a short tube and six elliptical segments; they have 12 stamens and one pistil. Other trees producing good gutta are found in Cochin-China, Venezuela, Costa Rica, and Australia. In 1860 vast forests of gutta-percha trees were found in Guiana, and many varieties of the tree flourish in the luxuriant forests of Brazil. An inferior quality is obtained from trees and climbers in Africa and Madagascar. There is also a variety known as *caoutchouc gutteux*, which combines many of the characteristics of gutta-percha and India rubber. The gutta-percha of commerce, which dates from 1843, when specimens were first sent to London from Singapore, comes chiefly from the Sunda Islands, Cochin-China, Cambodia, and Hindustan, Singapore being the chief shipping port. The different varieties on the market are designated by the place where they grew, the best being that coming from Macassar and Sarawak.

The present mode of obtaining the gutta-percha is a most destructive one, and attempts are being made in many countries to regulate by legislation the collection of the juice providing for the tapping of the standing trees. Ordinarily the finest trees are selected and cut down, and the bark stripped off; between the wood and bark a milky juice is found, which exudes and is scraped up into little troughs made of plantain leaves. The milk, as it flows from the tree, is snow white, but darkens on being exposed to the air. Like rubber, a thick cream forms on the top of the milk when allowed to stand and coagulate by gentle beating. This is removed, molded into cakes, and thrown into boiling water, from which it emerges ready to be shipped. Professor Jungfleisch of Paris has found that the leaves, whether fresh or dry, will yield to solvents like toluene from 9 to 10 per cent of an excellent quality of gutta-percha, and this has greatly improved the supply and will prevent the wasteful sacrifice of the trees.

It is imported in blocks and lumps of 5 to 10 pounds' weight, in various forms—chiefly large cakes or rounded into gourdlike lumps. It has a very light, reddish-brown, or almost a flesh color, and is full of irregular pores elongated in the direction in which the mass has been kneaded. It has a corklike appearance when cut and a peculiar cheeselike odor. Before it can be used it has to undergo some preparation. This consists in slicing the lumps into thin shavings, which are placed in a deviling or tearing machine revolving in a trough of hot water. This reduces the shavings to exceedingly small pieces, which, by the agitation of the tearing teeth, are washed free from many impurities, especially fragments of the bark of the tree. These, if not separated, would interfere with the compactness of its texture, which is one of its most important qualities. The small fragments, when sufficiently cleansed, are kneaded into masses which are rolled several times between heated cylinders, which press out any air or water and render the mass uniform in texture. It is then rolled between heated steel rollers into sheets of various thickness for use, or is formed into rods, pipes, or tubes. Hollow tubes are made in a machine similar to that which is used for making macaroni. Sometimes *caoutchouc gutteux* is mixed with the gutta-percha to make it more supple, or India-rubber to make it more elastic or possess other properties. Pigments as desired may be incorporated.

Gutta-percha was early turned by surgeons to various uses, chiefly for splints and covering moist applications to retard evaporation. A splint of gutta-percha is made by taking a rigid board of the substance cut to the desired shape, soaking it in hot water, and then bandaging it to the limb. In a few minutes the gutta-percha is found hard and modeled to the shape of the parts. Gutta-percha being readily soluble in chloroform, such a solution is sometimes used for covering raw surfaces, as, when the chloroform evaporates, it leaves a pellicle of solid gutta-percha. It is also used extensively in dentistry. It softens in warm water and can be molded into any form in that state, as when soft it is not sticky and turns well out of molds. It will always be of great value as a material in which to take casts, as it can in the soft state be made to take the sharpest forms most faithfully; and as it quickly becomes hard and preserves its shape, if not too thin, the range of its utility in this respect is very extensive.

The covers of golf balls are made of gutta-percha, and for this purpose the material is hardened by the removal of the resin.

Payen, after purifying gutta-percha by evaporation of its solution in carbon disulphide, succeeded in 1852 in separating it into three proximate principles: *gutta* (insoluble in both cold and boiling alcohol), 78 to 82 per cent; *fluavile* (soluble in cold alcohol), 4 to 6 per cent; *albane* (soluble in boiling alcohol), 14 to 16 per cent; but these substances are now thought to be mixtures rather than a single compound. In 1892 Oesterle discovered in gutta-percha a fourth constituent, guttane. The composition of gutta is $C_{20}H_{32}$, that of fluavile is $C_{20}H_{32}O$, and of albane, $C_{20}H_{32}O_2$.

Gutta-percha is supple, flexible, and very tenacious and extensible, so that it may be drawn out to many times its length and retain almost all the extension. It is insoluble in water and dilute acids; it resists alkalies and hydrofluoric acid, so that the latter may be contained in bottles or other receptacles made of or coated with gutta-percha. The most important application of gutta-percha is for the insulating coating of submarine conductors. While it oxidizes and becomes brittle when exposed to air, under water, as in the ocean cables, it is unchanged. Its value arises from the ease with which it can be worked and its being so complete a nonconductor of electricity. Its nonconducting power is not modified by burying it in the ground or plunging it in fresh or salt water, and it does not absorb water. Gutta-percha, specially selected and prepared, is used as an insulating material in more than 250,000 miles of ocean cables, and the weight thus employed is estimated in excess of 32,000 tons, not to mention the amount used on land lines stated at 8000 tons. It is its successful application to this purpose that made the extensive development of submarine telegraphy possible. From the time when Morse laid his telegraph line in New York harbor from the Battery to Governor's Island, in 1842, using an insulated copper cable, the promoters of submarine telegraphy began to seek for a suitable insulating material. At the same time Montgomerie was independently studying the properties of gutta-percha, and it was suggested by Wheatstone, who was unable to put the idea into practice, that it would be a suitable insulating covering for a submarine conductor. This was successfully accomplished about 1848.

Gutta-percha differs very materially from caoutchouc, or india rubber, in being nonelastic or elastic only in a very small degree. Notwithstanding this very striking character of caoutchouc, the two articles are often confounded in the public mind, probably from the similarity of their applications. India rubber is displacing gutta-percha in some of its most important applications and especially in the coating of both land and marine telegraph cables. See TELEGRAPH, SUBMARINE.

The amount of gutta-percha produced in the world is declining. In 1890 it was estimated at 4,500,000 kilograms, in 1901 at 2,400,500 kilograms, and in 1913 at 2,300,000 kilograms. The amount of unmanufactured gutta-percha imported into the United States reached a maximum in 1911, when, 1,648,921 pounds, valued at $390,548, entered the country. In 1913 these amounts were 480,853 pounds and $167,313. Manufactures of gutta-percha imported were valued as follows: 1910, $80,567; 1911, $61,283; 1912, $41,098; 1913, $77,300. In 1910, 97,000 hundredweight of gutta-percha, valued at £1,136,000, were imported into the United Kingdom.

Bibliography. Dr. Eugen Obach, *Die Guttapercha* (Dresden, 1899); M'Intosh, *India-Rubber and Gutta-Percha,* from the French of Seeligmann and Tonilhon (London, 1903; 2d ed., 1910); Clouth, *Rubber, Gutta-Percha, and Balata* (New York, 1903); Pearson, *Crude Rubber and Compound Ingredients* (2d ed., New York, 1909).

GUT'TA RO'SEA (Lat., red drop). A very old term used to denote a cutaneous eruption sometimes popularly called "toddy blossoms" from its frequent occurrence in aged drunkards. It is really a form of acne. (See ACNE.) Gutta rosea febrilis is a condition of the nose in certain malignant fevers when that organ becomes purple, swollen, and pustular. It was considered a fatal symptom. Gutta rosea herpetica was applied to eczema of the nose, accompanied by itching, formation of pimples, and blisters, and scaling of the skin. Gutta rosea leprosa was applied to leprosy of the face with pustules. Gutta rosea syphilitica was applied to the corona venerea, or row of papules and pustules appearing on the forehead of a syphilitic patient.

GUTTA SERE′NA (Lat., serene drop). An old name for a form of complete blindness. See Amaurosis.

GUTTA′TION. Plants growing in an atmosphere so humid that it is at or near saturation often exude liquid water that, issuing from water pores near the ends of the veins, form drops at the tips or at the marginal teeth. This process is known as guttation and may be observed in the early morning on grass, on grain seedlings, on cabbage, and many other plants. It is also evident on the mycelium of many fungi growing under moist conditions. Guttation is supposed to prevent the infiltration of the aërial system of the plant with water, with the consequent retardation of the process of food synthesis.

GUTTE. See Gutty.

GUTTENBERG, gŭt′*e*n-bêrg. A town in Hudson Co., N. J., 10 miles northeast of Jersey City on the Hudson River (Map: New Jersey, E 2). It has stone quarries, a lard refinery, and embroidery and pearl button factories. Pop., 1900, 3825; 1910, 5647.

GUTTENBRUNN, gụt′*e*n-brụn′, Adam Muller. See Muller-Guttenbrunn.

GUT′TER (OF. *gutiere*, Fr. *goutière*, from OF. *gote*, Fr. *goute*, drop, from Lat. *gutta*, drop). An open horizontal channel for conveying water from buildings, roads, etc. The Greeks used gutters at the eaves of their buildings, hollowed out of the stone which formed the cornice. These gutters discharged their contents on the ground at intervals through small gargoyles (q.v.), usually in the shape of lions' heads. The Romans followed this example and also formed gutters with tiles laid in cement. In the Middle Ages the eaves of secular buildings were often gutterless, except where it was found desirable to collect the rain water into cisterns. In ecclesiastical architecture it was necessary to convey the water from the roofs with great care, so as to prevent damage to the vaulting under the roof as well as to lower parts of the building. It was collected at the eaves of the central roof, thence conveyed to channels formed in the crest of the flying arches, and finally thrown off through gargoyles in each buttress, in a number of small streams, to the ground. Later, lead pipes were used to carry the water to the side-aisle roofs and still later to convey it directly to the ground and discharge it into open gutters. Pipes conveying the water to the base of the building were first employed in England, where they seem to have come into use during the fourteenth century, especially in secular buildings. They were formed with great taste and had ornamental cups or cisterns at the top to receive the water from the mouth of the gargoyle. They were then made square in form, not circular, as they usually now are. Such vertical pipes are called *leaders* or *conductors*, not gutters. In modern building the roof gutters are commonly of metal—copper in fine work, galvanized iron or tin in common work—or even of wood (cedar or cypress) in cottages and cheap buildings. The stone gutters of monumental buildings are often lined with metal to assure their water-tightness.

GUTTER POINT. The greatly elongated tip of foliage leaves not uncommonly seen in plants native to the rainy tropics. This facilitates the run off of the rain water that might otherwise flood the stomata and check the gas exchanges necessary for photosynthesis.

GUT′TY, or **GUT′TE′** (OF. *gouté*, *gotié*, spotted, from Lat. *guttatus*, spotted, from *gutta*, spot). In heraldry, a term used to describe a particular charge on a field, covered with drops. When the drops are red, they are supposed to represent drops of blood. In this case some great suffering or labor, such as fighting for the recovery of the Holy Land, is supposed to be indicated. Where the drops are blue, they represent tears. Where white, they are called drops of water; but it is possible that tears are intended in this case also, and that repentance or penitence is signified by both. A field or charge may be also *gutté de vert*, or green, to represent oil; *gutté de poix*, or black, to represent pitch; etc. See Heraldry.

GUTZKOW, gụts′kō, Karl (1811–78). A distinguished German novelist and dramatist, born in Berlin. He studied theology and philosophy in Berlin and early contributed to literary journals. He subsequently studied law and political sciences at Heidelberg and Munich, but devoted himself exclusively to literature. His early fiction is satirically skeptical, as is implied in the title of his first significant novel, *Wally, die Zweiflerin* (1835), for whose doctrines of free thought and free love he was imprisoned and all his writings forbidden, and others of his stripe, with the usual result of making them widely popular. This work is usually taken as the starting point of the so-called school known as Young Germany, literary reformers heralding the democratic upheaval of 1848. After his release from prison Gutzkow went to Hamburg and published four great dramas: *Richard Savage* (1839); *Zopf und Schwert* (1844); *Das Urbild des Tartüffe* (1847); *Uriel Acosta* (1848); and others of less merit. In 1847 he went to Dresden as director of the Court Theatre (till 1850) and wrote two remarkable political novels, *Die Ritter vom Geiste* (9 vols., 1850–52) and *Der Zauberer von Rom* (9 vols., 1859–61). From 1852 to 1862 he edited the family weekly *Unterhaltungen am häuslichen Herd.* In 1864 he had an attack of insanity, and though after his recovery he continued to write voluminously, he never regained his power. Gutzkow's strong controversial purpose obscured his artistic genius, but his work has profoundly influenced the popular thought of modern Germany and gives one of the best pictures we have of the intellectual life and the social struggle of his generation and nation. His complete works appeared, 1873–78, in 32 volumes. Consult: Prölss, *Das junge Deutschland* (Stuttgart, 1892); Frenzel, *Erinnerungen und Strömungen* (Leipzig, 1890); Houben, *Studien über die Dramen Gutzkows* (Jena, 1899); Caselmann, *Karl Gutzkows Stellung zu den religiös-ethischen Problemen seiner Zeit* (Augsburg, 1900); J. Dresch, *Gutzkow et la jeune Allemagne* (Paris, 1904); H. H. Houben, biographical introduction to Gutzkow's selected works (Leipzig, 1908); Bernhard Rieffert, *Karl Gutzkows Stellung zur Romantik* (Münster, 1908); Paul Weiglin, *Gutzkows und Laubes Literaturdramen* (Berlin, 1910).

GÜTZLAFF, gụts′lȧf, Karl F. A. (1803–51). A missionary, historian, and author, born at Pyritz, Pomerania. In the service of the Netherlands Missionary Society he studied Chinese at Batavia (1826–28). Severing his connection with the Missionary Society, he went to Singapore and a few months later to Siam, where he engaged in translating the Scriptures into Siamese. His wife dying in 1831, he went to Macao, where, and later at Hongkong, he assisted Morrison (q.v.) and Medhurst (q.v.) in translating the Bible into Chinese and was incessantly active in gospel labors. In personal appearance Gützlaff was so like a native that he was able to pass for one when traveling in the costume of the country. His influence as physician and preacher was magnetic. He served for a while as interpreter to the British government, assisting in the peace negotiations of 1842. He was especially active in raising up a native ministry and in diffusing information in Chinese. He made many voyages in countries near China. On his visit to Europe his powerful addresses inspired many young men to enter upon Eastern careers, among them G. F. Verbeck (q.v.), Japan, and Sir Harry Parkes (q.v.), China. Consult his *Journal of Three Voyages along the Coast of China, with Notices of Siam, Corea, and the Loo Choo Islands* (New York, 1833); *Chinese History* (2 vols., London, 1834); *China Opened* (rev. by the Rev. Andrew Reed, 2 vols., ib., 1838; a German edition of this work was also published, Stuttgart, 1847); *Life of Taou-Kwang, Late Emperor of China* (1851), besides many learned contributions to periodicals. He died at Hongkong. One of the ablest and most efficient men in the opening of the East, his services have received scant recognition. A biography of Gützlaff by Gaïhan, *Gützlaff der Missionar der Chinesen,* was brought out at Duisburg in 1850.

GUY, Thomas (c.1645–1724). An English philanthropist, the founder of Guy's Hospital (q.v.) in London. After serving as apprentice to a bookseller for eight years, he began business for himself on a capital of £200; he dealt largely in Bibles, which at first he imported from Holland. Later he became printer to the University of Oxford, and it was largely owing to him that the universities were able to beat the King's printers, who were trying to drive them out of the publishing business. He was a member of Parliament from 1695 to 1707. In 1678 he gave his first public charity—an almshouse at Tamworth for the accommodation of six poor women. Five years later he enlarged this almshouse so that it could accommodate 14 men and women. He gave generously to the poor, to release insolvent debtors, and to start young men in business. To relieve the overcrowded condition of St. Thomas's Hospital, he built three new wards, and then, having acquired a great fortune by the rise of South Sea stock, applied a large part of it to building the hospital which bears his name. Consult *A True Copy of the Last Will and Testament of Thomas Guy, Esq.* (London, 1725).

GUYAU, gḗ′yṓ′, Jean Marie (1854–88). A French philosopher, born at Laval. His ill health did not lessen his activity, and he produced much before his early death. A critic rather than a constructive scholar, he still advanced the theory that altruism is not artificial, but instinctive—a particularization of psychological law that instinct tends to be destroyed or diminished as it becomes conscious; and, in ethics, he held that "I can, therefore I must," is a truer characterization than "I must, therefore I can." Besides contributions to the *Revue des Deux Mondes* and the *Revue Philosophique,* he wrote: *Vers d'un philosophe* (1881); *La morale anglaise contemporaine* (1885); *Esquisse d'une morale sans obligation ni sanctions* (2d ed., 1890); *L'Irréligion de l'avenir* (1887); *Education et hérédité* (1889); *La genèse de l'idée du temps* (1890). Consult the essay in Royce, *Studies of Good and Evil* (New York, 1898); Lambert, "L'Œuvre sociologique de Guyau," in the *Revue Internationale de Sociologie,* vol. viii (Paris, 1901); G. Aslan, *La morale selon Guyau* (ib., 1906); M. Weisner, *Jean Marie Guyaus Philosophie der Moral* (Heidelberg, 1910).

GUY DE MAUPASSANT, gḗ de mṓ′pȧ′säɴ′. See Maupassant.

GUY D'HARDELOT. See Hardelot, Guy d'.

GUY FAWKES, gī fạks. An English conspirator. See Fawkes.

GUY (gī) **MAN′NERING.** A novel by Walter Scott (1815).

GUY OF AREZZO, ȧ-rĕt′sṓ. See Guido d' Arezzo.

GUY, or **GUIDO** (gwē′dṓ), **OF LUSIGNAN,** lụ′zḗ′nyäɴ′ (?–1194). King of Cyprus and Jerusalem. He was the son of Hugo VIII of Lusignan, the head of that family in Poitou. During a journey to the Holy Land he married Sibylla, the daughter of Amabric, or Amaury, King of Jerusalem (1180), was Regent from 1182, and became King himself upon the death in 1186 of Baldwin V, Sibylla's son by her first husband, the Marquis of Montferrat. In a war which ensued with Saladin he was defeated and taken prisoner at the battle of Tiberias, or Hattin (1187). In 1190, after the death of Sibylla, the crown passed to Conrad through his wife Isabella. He was not kept long in captivity and resumed operations against the Moslems, laying siege to Acre in 1189. Richard I of England in 1192 transferred to Guy the island of Cyprus (1192), where he reigned until his death. He was succeeded by his brother, Amaury, Count of Jaffa. Consult Röhricht, *Geschichte des Königreichs Jerusalem* (Innsbruck, 1898).

GUY OF WARWICK, wŏr′ĭk. The hero of a popular English legend. Guy is represented as the son of Siward of Wallingford. Becoming page to Rohand, Earl of Warwick, he falls in love with the Earl's daughter, named Felice, who declines to marry him until he has proved his knighthood. To this end he makes two expeditions to the Continent, going as far east as Constantinople. He returns to England, slays a dragon, marries Felice, and departs for the Holy Land. Returning to England just at the time when Athelstan is besieged by the Danes at Winchester, he slays in single combat Colbrand, a terrible giant in the Danish army. He retires to a hermit's cell, where he dies. Scholars have attempted to find at the basis of the legend some historical incident. The fight between Guy and the giant has been doubtfully identified with the battle of Brunanburh (937) between Athelstan and Anlaf the Dane. While this is hardly more than conjecture, it is generally agreed that the legend rests upon English traditions of the tenth and eleventh centuries. It was given literary form by an Anglo-Norman poet of the twelfth century, and from French it passed into English (fourteenth century). From that time on, the story, implicitly believed in all its details, was extremely popular, as is indicated by several Middle English versions. It was printed by William Copland (middle of the sixteenth century); versified incidents from it were recited by minstrels; it was dramatized by Day and Dekker in collaboration; and, reduced to a chapbook, it circulated widely throughout the eighteenth century. Samuel Pegge, in 1781, first showed the unhistorical character of the legend. Consult: Zupitza, *Zur Litteraturgeschichte des Guy von Warwick* (Vienna, 1873); manuscripts of the Middle English versions edited by him for the Early English Text Society (London, 1875–76, 1883–92); *Speculum Guy de Warewyke*, edited by Morrill for the same society (London, 1898); M. L. A. Deutschbein, *Studien zur Sagengeschichte Englands* (Cöthen, 1906).

GUYON, gē̇'ôN', Jeanne Marie Bouvier de la Motte- (1648–1717). A French writer on mystical subjects. She was born of noble parents at Montargis, April 13, 1648. She wished to enter a convent, but her parents prevailed upon her when not quite 16 to marry Jacques de la Motte-Guyon, who was 22 years her senior and at first had no sympathy with her extreme mystical tendencies. Before his death, in 1676, he learned to appreciate her goodness. A widow at 28 with five children, she devoted herself to their education for several years. Later she moved to Paris, where, as an attractive wealthy widow, she had many suitors. About 1680, after settling most of her fortune on her children, she went to Geneva for religious work. At this time she fell into melancholic depression, from which her spiritual director, Père Lacombe, aroused her. Madame Guyon followed in her director's footsteps and wrote a *Short and Easy Method of Prayer* (rev. trans., London, 1902), besides commentaries on the Scriptures, which brought her under ecclesiastical censure. While protesting submission, she continued to write and teach as before. Her life after this is a series of persecutions for her religious ideas. She was accused of laying too much stress on faith and the quietude of contemplation rather than good works in the Christian life. Shut up by a royal order in the convent of the Visitation (1688), she was set free by the influence of Madame de Maintenon, and through her obtained entrance into the highest circles of the French nobility. Fénelon, convinced of her personal goodness, allowed himself to be led into a false position in her defense. (See Fénelon.) Politics became a factor in her condemnation and the severity of her sentence. For a time Madame Guyon was confined in the Bastille, but her virtuous character was acknowledged by the assembly of the French clergy in 1700. She was released from prison, however, only in 1702 and then was banished. She passed the rest of her life in retirement at Blois, where she died June 7, 1717, professing absolute faith in the Roman Catholic church and its dogmas. Her life has attracted attention partly because of Fénelon's interest in her and partly because of her persecution by the Church authorities. See seems to have been neurotic and hysterical, but the imputations made against her moral character because of her relations to Père Lacombe are undoubtedly groundless. Her religion was the form of mysticism called quietism (q.v.).

Consult: *Œuvres spirituelles de Mme. Guyon* (42 vols., Cologne, 1713–22); Guerrier, *Mme. Guyon, sa vie, sa doctrine, son influence* (Paris, 1881); Upham, *Life, Religious Opinions and Experiences of Mme. Guyon* (New York, 1847). For her spiritual life, the best work to consult is *La vie de Mme. J. M. B. de la Motte Guyon écrite par elle-mème* (3 vols., Cologne, 1720). This was probably not composed by herself as it now exists, but is a compilation of documents left by her. The most complete translation is *Autobiography of Madame Guyon* (2 vols., St. Louis, 1897). There is a *Recueil de poésies spirituelles* (5 vols., Amsterdam, 1689). Some of these have been translated by the English poet Cowper. Consult her *Spiritual Torrents* translated by Marston (London, 1908), and M. Masson, *Fénelon et Madame Guyon* (Paris, 1907).

GUYON, gī'ŏn, Richard Debaufre (1813–56). A general in the Hungarian army in the revolution of 1848–49. He was born at Wolcott, near Bath, in England. After fighting against Dom Miguel in Portugal, Guyon entered the Austrian service in 1832 and was among the first to offer his services to the Hungarian government in 1848. He fought with great distinction at Schwechat (Oct. 30, 1848) and Tyrnau (December 14), and in February, 1849, as a commander of a division in Görgey's army, carried the mountain pass of Branyiszkó. When in April, 1849, the garrison of the besieged fortress of Komorn was to be apprised of the victorious approach of the national army, Guyon, with a detachment of hussars, cut his way through the enemy's lines and entered the town. He was made a general for this service. He took Arad, July 1, and shared in the victory of Hegyes and in the disasters of Szöreg and Temesvár. After the last battle Guyon escaped to Turkey, and entered the service of the Sultan as a lieutenant general. Under the name of Kurshid Pasha he was Governor of Damascus, and at the beginning of the Crimean War did much to organize the Army of Kars. He died at Constantinople.

GUYOT, gē̇'ȯ', Arnold (1807–84). A Swiss-American geographer and geologist, born near Neuchâtel, Switzerland. He studied at the College of Neuchâtel and the University of Berlin, from 1835 to 1839 was a private tutor in Paris, and from 1839 to 1848 professor of history and physical geography in the College of Neuchâtel. In 1848 he settled at Cambridge, Mass., in the same year gave a series of lectures at the Lowell Institute, Boston, from 1848 to 1854 was in the service of the Massachusetts State Board of Education as a lecturer, and from 1855 until his death was professor of physical geography and geology in Princeton. He also held a lectureship in Princeton Theological Seminary from 1861 to 1866. In 1838 he made one of the earliest scientific investigations regarding glaciers, and in a paper submitted in that year to the Geological Society of France was the first to proclaim and account for the laminated structure of the glacial ice. He perfected a system of meteorological observations for the United States from which the present Weather Bureau was derived; made barometric surveys of the Appalachian Mountain chain, and prepared *Meteorological and Physical Tables* (1852; rev. ed., 1884), a collection that has been very extensively used. He also did much for the study of geography in America through the preparation of series of textbooks and wall maps, for which he obtained a medal of progress at the Vienna Exhibition of 1873. In addition to numerous papers, contributed to the *American Journal of Science*, the reports of the American Association for the Advancement of Science and the Smithsonian Institution, and other periodicals, he published *Earth and Man* (1853; the Lowell Lectures, trans. by C. C. Felton); *A Treatise on Physical Geography* (1873); *Memoir of Louis Agassiz* (1883); *Creation, or the Bible Cosmogony in the Light of Modern Science* (1884). A sketch of his life is given by Dana in the *Biographical Memoirs of the National Academy of Sciences* (vol. ii Washington, 1886), which contains a complete list of Guyot's writings.

GUYOT, Yves (1843–). A French politician and publicist, born at Dinan (Côtes-du-Nord) and educated at Rennes. After a career as a journalist, and as a member of the Radical party in the Chamber of Deputies, he was appointed Minister of Public Works in the Tirard cabinet (1889) and retained this portfolio in the Freycinet ministry (1890–92). He became known as a champion of commercial and industrial freedom and an opponent of protectionism and of Socialism, especially of the Socialistic government ownership theory. M. Guyot took a prominent part in the discussion over the Dreyfus affair. In association with A. Raffalovitch he published a *Dictionnaire du commerce, de l'industrie et de la banque.* His works include: *Etudes sur les doctrines sociales du christianisme* (2d ed., 1881); *La science économique* (2d ed., 1887); *La tyrannie socialiste* (1893); *Les conflits du travail et leur solution* (1903); *Le commerce* (1908); *La gestion par l'Etat* (1913), translated and published in New York City (1914) as *Where and Why Public Ownership has Failed; L'industrie et les industriels* (1914).

GUYSBOROUGH, gīz′bûr-ō̇. A seaport town, capital of Guysborough Co., Nova Scotia, Canada, on Chedabucto Bay, 61 miles east-southeast of Pictou (Map: Nova Scotia, H 3). It has a fine harbor, and there is steamer communication with Mulgrave. Fishing is the leading occupation. There are also lumber and wood-carving industries and manufactories of carriages and barrels. Guysborough was founded in 1783. Pop., 1901, 1411; 1911, 1218.

GUYSE, gīz, John (1680–1761). An English Presbyterian divine. From 1727 till his death, Nov. 22, 1761, he was a preacher in London. He is remembered for his *Practical Expositor, an Exposition of the New Testament in the Form of a Paraphrase* (London, 1739–52), frequently republished and reprinted and once very popular.

GUY'S HOSPITAL, Southwark, London. An institution founded by Thomas Guy (q.v.), a London bookseller, who leased from the governors of St. Thomas's Hospital a large piece of ground for a term of 999 years, at a ground rent of £30 a year. The building was begun in 1722, and the hospital admitted its first patient in 1725, a few days after the death of its founder, who bequeathed £219,499 to endow it. In 1829 William Hunt bequeathed to the hospital £180,000, and additional bequests have since been received. The number of beds has been increased from 400 to 618. The yearly average of patients is over 9000; the out-patients relieved numbered, in 1913, 120,988, with a maternity service of 3195. The annual income in 1912 was £61,862 in addition to £14,330 in legacies. A library and valuable museum are attached to the hospital. New wards were built in 1852 and a chemical laboratory in 1872. Additional laboratories were added in 1893. Students enter the hospital medical school and pay annual fees. Guy's confers no degrees. Sixty students besides the house staff are lodged in the residential building. There is also a dental school (Guy's Hospital Dental School) in conjunction with the medical college and affiliated with the University of London. In the chapel is a fine marble statue of Guy by Bacon. Sir Astley Cooper, the eminent surgeon, is buried in the chapel. Consult Wilks and Bellamy, *History of Guy's Hospital* (London. 1893).

GUYTON DE MORVEAU, gē′tôɴ′ de môr′vō̇′, Louis Bernard, Baron (1737–1816). A French chemist, born at Dijon. He was from 1751 to 1782 deputy attorney-general in the parliament of his native city, but devoted most of his time to the study of the physical sciences and published a number of interesting original researches. In 1782 he undertook to reform the system of chemical nomenclature. Soon Lavoisier, Berthollet, and others joined him in this important work, and in 1787 they published their *Méthode d'une nomenclature chimique,* which was unanimously adopted by the scientific world. Guyton wrote a "Dictionary of Chemistry" for the *Encyclopédie méthodique.* He was professor of chemistry at the Ecole Polytechnique and one of the first members of the Institute. In 1791 he was a member of the Legislative Assembly and in 1792–97 of the Convention, where he voted for the execution of Louis XVI. From 1800 to 1814 he was at the head of the French mint, where he did much to promote the use of the decimal system.

GUZEL-HISSAR, gụ′zel-hĭs-sär′. A city in Asiatic Turkey. See Aidin.

GUZERAT, gōō′ze-rät. See Gujarat.

GUZMÁN, gōōth-män′, De. A title often applied to St. Dominic. See Dominic, Saint.

GUZMÁN, Gásparo de. See Olivárez, Count.

GUZMÁN, Nuño (or Nuñez) Beltran (c.1485–1544). A Spanish lawyer and soldier, born at Guadalajara. He was for a time Encomendero at Puerto de Plata, Española, and in 1526 was appointed Governor of Pánuco, a province of northwestern Mexico, where he ruled with great cruelty. He schemed against Cortés and invaded Narváez's territory of Río de las Palmas. On account of his ability he was made President of the first Audiencia of Mexico in 1528, with instructions to check the excesses of Cortés. Unscrupulous, he misruled the country till 1531, when he was superseded by the President of the second Audiencia. He conquered the district long known as Nueva Galicia in 1530 and was appointed its Governor. He had little save his bravery to recommend him. Consult Bancroft, *History of Mexico* (San Francisco, 1883–88).

GUZMÁN BLANCO, blän′kō̇, Antonio (1829–99). A Venezuelan soldier and political leader, born in Carácas. He studied law at the University of Carácas, and after practicing some years he began his military career in 1859. Banished for his share in political disturbances he took a prominent part in two invasions, and became Vice President of Venezuela under Falcón in 1863. Driven from office in 1868, he headed a revolution, which restored him to power in 1870. He was acclaimed *Ilustre Americano, Regenerador y Pacificador de Venezuela,* and for many years he was virtual dictator of the country. Other men were occasionally permitted to fill the office of President, but they were merely figureheads. In 1889, however, popular discontent was aggravated by reports of corrupt contracts made in Paris; and Guzmán Blanco, who was then acting as envoy to all the European powers, was practically deposed by Congress. Although he amassed great wealth by questionable methods, and his rule was despotic, he introduced many beneficent reforms, improved the public credit, founded schools, and built canals and railways. *Glorias del . . . General Guzmán Blanco* (Carácas, 1875) contains his writings and public documents.

GUZMÁN DE ALFARACHE, då ål′få-rä′-chå. The hero of a Spanish romance by Mateo Aleman, published at Madrid—the first part in 1599, the second in 1605.

GWALIOR, gwä′lē-ôr. A native state or agency of Central India, the dominions of the Maharajah Sindhia, consisting of a main northern portion, which is separated from Rajputana, on the northwest, by the Chambal River, and of several detached portions straggling far to the south (Map: India, C 3). Area, 25,107 square miles. Lying partly in the basin of the Jumna, and partly in the basins of the Nerbudda and the Tapti, it divides its drainage between the Bay of Bengal and the Arabian Sea. The population, including that of the Guna Agency, which was united with Gwalior in 1896, in 1901 was 2,933,000 and, in 1911, 3,093,082. Though Gwalior is a Mahratta principality, it is only to the south of the Nerbudda that the Mahrattas form any considerable proportion of the people. More than 84 per cent of the people are Hindus, mainly engaged in agriculture, the chief products being wheat, millet, and other cereals, cotton, and tobacco. Since 1803 the country has been under British protection; the existing relations date from 1844. In 1843 the death of the sovereign, by producing universal anarchy, led to the forcible interposition of the British government. By a treaty of the following January, in addition to a large contingent under British authority, the native government was permitted to have 9000 troops of its own. Capital, Gwalior, also known as Lashkar (q.v.).

GWALIOR. The capital of the state of the same name in Central India, near the northeast extremity of its straggling territory (Map: India, C 3). Its nucleus is a citadel crowning an isolated rock about 300 feet in height, perpendicular on all sides, and measuring 1½ miles by 300 yards. It can accommodate a garrison of 15,000 men. The spot is supposed to have been occupied as a stronghold for more than 1000 years, and the summit has been provided from time to time with several spacious tanks. Along the eastern base of this eminence lies the old city of Gwalior, which contains a beautiful mosque of white sandstone, while in the vicinity palaces, rock temples, and statues abound, of particular archæological and architectural interest. The old town is now decaying, and a new town has sprung up to the southwest at Lashkar, originally the camp of the Maharajah's army; to the northeast is the Murar, formerly the cantonment of the protecting contingent. The city includes the towns of Gwalior, Lashkar, and Gwalior Brigade. Gwalior has had a long and eventful history, not the least important among its varied incidents being the mutiny of the native army in 1857, notwithstanding the fidelity of the Maharajah. Pop., 1901, 119,433; 1911, 70,881.

GWAT′KIN, Henry Melvill (c.1844–). An English Church historian. He was educated at Shrewsbury and at St. John's College, Cambridge, of which he was fellow in 1868–74 and theological lecturer in 1874–91. In 1891 he became fellow of Emmanuel College and Dixie professor of ecclesiastical history. He was Gifford lecturer at Edinburgh in 1903–05; the lectures were published (1906) under the title *The Knowledge of God.* His other publications include: *Studies of Arianism* (1882; 2d ed., 1900); *The Arian Controversy* (1889); a volume of sermons, *The Eye of Spiritual Things* (1906); and *Early Church History* (1909). He was one of the editors of the *Cambridge Mediæval History.*

GWIN, Nell. See Gwynn, Eleanor.

GWIN, William McKendry (1805–85). An American politician. He was born in Sumner Co., Tenn., graduated in medicine at Transylvania University in 1828, and for five years was a practicing physician at Clinton, Miss. He was a Democratic Congressman from that State in 1841–42, but in 1848 declined a renomination and in 1849 went with the gold hunters to California. He was a member of the California Constitutional Convention late in 1849 and was a member of the United States Senate from 1850 to 1861. He was influential in building up the Pacific coast. After leaving the Senate, he was arrested on a charge of disloyalty and was imprisoned for two years. On his release, he went to France and took part in an unsuccessful scheme for colonizing Sonora, Mexico, with people from the southern part of the United States.

GWIN′NETT, Button (c.1732–77). An American patriot, a signer of the Declaration of Independence. He was born in England, engaged in business in Bristol, and later removed to Charleston, S. C. About 1770 he purchased a plantation on St. Catherine's Island, Ga. Through acquaintance with Dr. Lyman Hall he became intensely interested in the early Revolutionary movement in Georgia and in 1775 was a member of the first delegation elected by that province to the Continental Congress. He was a member of that body at the time of the adoption of the Declaration of Independence, of which he was one of the signers. In 1776–77, as a member of the Georgia Constitutional Convention, he took a prominent part in framing the new State constitution and in the same year was president of the Provincial Council. Defeated both for the office of Governor under the new constitution and for selection as brigadier general of the Georgia troops, he expressed his resentment openly against Gen. Lachlan McIntosh, who had been successful in securing the latter post. A duel followed in which both principals were wounded, Gwinnett mortally. Consult Dwight, *Lives of the Signers* (new ed., New York, 1895).

GWYNIAD, gwĭn′ĭ-åd (Welsh, whiting). A British whitefish (*Coregonus faro*), usually called a herring on account of its form, large scales, and silvery appearance. It is of inferior quality as a food fish. See Whitefish.

GWYNN, GWIN, or **GWYN,** Eleanor (1650–87). An English actress, mistress of Charles II. The place of her birth is not definitely known. She was brought up in poverty and as a child sold oranges at the Theatre Royal in London. In 1665 she made her first public appearance as Cydaria in Dryden's *Indian Emperor* and from that time until 1670 (when she left the stage) was a great favorite in parts which were supplied by Dryden. If not a great actress, her sprightliness, beauty, and skill in dancing made her a popular favorite. She had many lovers, among them Charles Hart the actor and Charles Sackville, who in 1677 became sixth Earl of Dorset. About 1669 she became the mistress of the King, by whom she had two sons, Charles (1670), called Beauclerk, who was subsequently made Duke of St. Albans, and James (1671), who died young. She retained her popularity throughout life. As the King's mistress, she was received into the best of London society, and she was in favor with the people for her many acts of charity. She was illiterate, even for those times; but her animation, humor, and good nature seem to have more than overbalanced her defects. According to Burnet and Evelyn, the dying request of Charles II was, "Let not poor Nelly starve." After the King's death she led a quiet life. She died in London and was buried in the church of St. Martin's-in-the-Fields. According to her request Dr. Tenison, afterward Archbishop of Canterbury, preached her funeral sermon. Consult: Seymour, *Memoirs of the Life of Eleanor Gwinn* (London, 1752); Airy, *Charles II* (ib., 1904); Cunningham, *The Story of Nell Gwyn*, ed. by Goodwin (new ed., ib., 1908); Cecil Chesterton, *Nell Gwyn* (Edinburgh, 1912).

GYA, gī′ȧ. A town in Bengal, British India. See GAYA.

GYAROS, jī′ȧ-rŏs. One of the Cyclades (q.v.), known at present as Giura, situated 10 miles northwest of Syros. Area, about 12 square miles. It is mountainous and uninhabited and was once used by Rome as a place of banishment.

GYAS, jī′*a*s. 1. A companion of Æneas and commander of one of his ships. 2. A Latin in the army of Turnus, slain by Æneas.

GYBE. See JIBE.

GYGES, jī′jēz (Lat., from Gk. *Γύγης*). King of Lydia from c.689 to c.657 B.C. and the founder of the powerful dynasty of the Mermnadæ. According to Herodotus (i, 8–14), Gyges was the favorite of King Candaules of the ancient line of the Heraclides and commander of the household troops. Herodotus declares also that Candaules, proud of his beautiful queen, Nyssia, concealed Gyges in the royal bedchamber one night to prove the truth of the extravagant praises he had bestowed on her beauty. The Queen became aware of the presence of Gyges, but pretended ignorance, and, summoning him on the morrow, offered him the choice between her hand, together with the throne of Candaules, and death. Gyges slew the King and seized the crown. The Lydians resisted his usurpation until the oracle at Delphi, bribed by gifts of immense value, declared in his favor. He waged successful wars against the Greek cities on the coast of the Ægean and extended the boundaries of the Empire. According to the Annals of Asurbanipal, "Gyges [Gugu], King of Lydia," sent a messenger to Nineveh requesting the assistance of the Assyrian King against the Cimmerians (Gimirrai). With the aid of the Assyrian gods Gyges defeated the Cimmerians and sent two of their chiefs in chains together with a large present to Asurbanipal. This seems to have occurred c.666 B.C. Later he threw off his dependence upon Assyria, entered into an alliance with Psammetichus, King of Egypt (663–610 B.C.), when this ruler rebelled against Asurbanipal, and furnished him with troops. A new Cimmerian invasion followed; Gyges was defeated and killed in battle, and his country was devastated (c.657 B.C.). The Rassam Cylinder and allied texts, recounting these events, have been translated by Jensen in *Keilinschriftliche Bibliothek*, vol. ii (Berlin, 1890). Plato (*Republic*, 359) has a fable in which Gyges is represented as a shepherd of Candaules, who had discovered a magic ring by which he was enabled to make himself invisible, by which means he murdered Candaules and secured the sovereignty. According to a third tradition Gyges overthrew Candaules with the aid of foreign mercenaries. The "riches of Gyges" and the "ring of Gyges" were popular proverbs in ancient and mediæval times. Consult the edition of Herodotus by How and Wells (Oxford, 1912); Schubert, *Geschichte der Könige von Lydien* (Breslau, 1884); Radet, *La Lydie et le monde grecque au temps de Mermnades* (Paris, 1893); Smith, "The Tale of Gyges and the King of Lydia," in *American Journal of Philology*, xxiii (New York, 1902); Gelzer, "Das Zeitalter des Gyges," in *Rheinisches Museum*, vol. xxx (Frankfurt, 1875), vol. xxxv (1880); Ed. Meyer, *Geschichte des Altertums*, vol. ii (Stuttgart, 1893); Winckler, *Altorientalische Forschungen*, vol. i (Leipzig, 1897); id., in Schrader, *Die Keilinschriften und das Alte Testament* (3d ed., Berlin, 1902); Beloch, *Griechische Geschichte*, vol. i (2d ed., Strassburg, 1912).

GYLDÉN, yṳl-dān′, JOHANN AUGUST HUGO (1841–96). A Swedish astronomer, born and educated at Helsingfors, Finland. Having been an assistant to Struve in the observatory at Pulkova from 1863 to 1871, he was appointed director of the Royal Observatory at Stockholm, Sweden, in the latter year. In 1884 he was offered the directorship of the observatory at the University of Göttingen. He published: *Untersuchungen über die Konstitution der Atmosphäre* (1866–68): *Studien auf dem Gebiete der Störungstheorie* (1871); *Die Grundlehren der Astronomie nach ihrer geschichtlichen Entwicklung dargestellt* (1877); *Versuch einer mathematischen Theorie zur Erklärung des Lichtwechsels der veränderlichen Sterne* (1879): *Die intermediäre Bahn des Mondes* (1883); *Untersunehungen über die Konvergenz der Reihen welche zur Darstellung der Koordinaten der Planeten angewendet werden* (1887); *Nouvelles recherches sur les séries employées dans les théories des planètes* (1893); *Traité analytique des orbites absolues des huit planètes principales* (1893).

GYLIPPUS, jĭ-lĭp′pŭs (Lat., from Gk. *Γύλιππος*). A Spartan general in the Peloponnesian war, son of Cleandridas, the councilor and fellow exile of the young King Pleistoanax. He was appointed the commander of the expedition sent to aid the Syracusans against the Athenians (414 B.C.). Though his ships were so few that Nicias at first thought they belonged to an insignificant privateering expedition, Gylippus, with the reënforcements drawn from various Sicilian towns, by his skillful operations completely defeated the Athenians and captured their commanders, Nicias and Demosthenes, in 413 B.C. (See SYRACUSE.) After the capitulation of Athens to Lysander, Gylippus was commissioned by the latter to take home the treasure, but stole a considerable portion and was condemned to death for the crime. He escaped, however, and died in exile. Consult: Plutarch, *Nicias*, 19, 21, 27, 28; Diodorus Siculus, xiii, 28–32; Thucydides, vii.

GYLLEMBOURG-EHRENSVÄRD, yṳl′lem-bōōr-y'ā′rĕn-svârd, THOMASINE CHRISTINE, BARONESS (1773–1856). A Danish novelist, born at Copenhagen. Born Buntzen, she married first Peter Andreas Heiberg, banished for political activity, and had one son, Johan Ludvig Heiberg (q.v.). She then married a Swedish political refugee, Baron Ehrensvärd, who assumed in Copenhagen his mother's name, Gyllembourg, and who died in 1815. After this she lived with her son, the poet Heiberg, and at 53 began a busy literary career with *The Polonius Family* (1825), in the weekly edited by her son. Not till after her death was her authorship known. Among her better novels are *Near and Far* (1841) and *Two Generations* (1845). Her collected works appeared in 12 volumes (1849–51).

GYLLENBORG, yu̥l′len-bôr-y', Karl, Count (1679–1746). A Swedish statesman and author. He was born at Stockholm and after serving in the Polish War was sent to London as Secretary of Legation. In 1715 he was made Minister Plenipotentiary and two years later was imprisoned for five months because of his participation in the plot to reinstate the house of Stuart. In 1723 he was appointed Councilor of State and in 1738 Prime Minister. While in this office he founded the *Hattparti*, or *Hattar* (Hat party), which instigated the disastrous war with Russia (1741–43), resulting in the loss of the Province of Viborg. He was successively chancellor of the universities of Lund (1728) and Upsala (1739), was a patron of letters and art, and wrote several poems and the first Swedish comedy, *Den svenska Sprätthöken* (1740). His *Letters . . . Relating to a Design to Raise a Rebellion on His Majesty's Dominions, to be Supported by a Force from Sweden* were published in French and English (1717).

GYMKHANA, gĭm-kä′nȧ (probably a corruption of Pers. *gand-khanah*, ball house, influenced by popular association with *gym-nasium;* also explained as being from Eng. *game* + Pers. *khanah*, house). A generic term, originating in India and signifying an outdoor meeting for recreation purposes. Ordinarily gymkhanas are of two kinds—one, a race meeting on a small scale, in which any sort of horse takes part in order to make up a "card," and in which the races are generally for catch weights. The second type of gymkhana is a variety of what was formerly called the "pāgăl" (foolish or amusing) gymkhana, in which, besides the usual horse and pony races, other competitions for men and women, mounted and dismounted, are introduced; also tent pegging and tilting—the former for men and the latter for women. Every cantonment in India, no matter how remote or how large or small, has its periodical gymkhana. The "card," or programme, is arranged so as to include all classes of cantonment society and consists of flat and obstacle racing, jumping, blindfold races, egg and spoon races, sack races, etc., for the rank and file of the local garrison. Among the events set apart for the natives none is more important than the race with an earthenware chatti full of water, carried on the head, or the wheelbarrow races. For the officers, military and civil, are such events as "tent pegging" and "tilting" in couples, in which the man rides at the peg and the woman tilts at a ring; "threading-the-needle" race; "Aunt Sally" race, performed by two men and two women, riding from the starting point to a fixed place, where the men dismount their partners and hold their horses, while the women throw stones at four empty bottles. The moment the bottles are broken the women are remounted, and the partners race back to the post. A favorite competition is the "wand," or "maize" event, in which mounted competitors canter in and out between rows of posts or wands driven into the ground and placed at convenient distances apart from one another in two parallel lines. The competitors must "make the ride" without touching a post. A menagerie race usually winds up the meeting, and, owing to the many varieties of animals common to the country, an extremely varied assortment of competitors is always possible. In the hill stations the concluding feature is generally a "jinrikisha" (colloquially ricksha) race, in which these light conveyances, drawn by coolies and driven by Europeans, race with each other. A ricksha may be described as an enlarged perambulator mounted on two wheels and fitted with a shaft. It is drawn by two natives in the shaft, while two push behind. Although the gymkhana has become popular in England within recent years and has also been introduced into America, it has not the same reason for existence, or value as a sport. In India, owing to the nature of the climate and the few hours of comparative coolness, together with the impossibility of following the ordinary sports of the West, considerable ingenuity has to be exercised to invent games which shall afford harmless amusement and at the same time be within the scope of the usually limited resources of the average cantonment.

GYMNASIA (gĭm-nä′zĭ-ȧ) **AND REAL-GYMNASIA**, rå-äl′gĭm-nä′zĭ-ȧ (Lat. nom. pl., from Gk. *γυμνάσιον*, *gymnasion*, from *γυμνάζειν*, *gymnazein*, to train, from *γυμνός*, *gymnos*, naked). The classical higher or secondary schools of Germany, graduation from which, until recently, necessarily preceded the university course and all professional careers. The Gymnasia arose in Germany out of the humanistic movement during the sixteenth century. The existing schools were monastic and cathedral under the control of the Church, and guild schools controlled by the guilds or municipalities, but yet taught and dominated by the clergy. Such schools were devoted almost exclusively to the study of Latin, organized into the traditional curriculum, consisting of the trivium (q.v.) grammar, rhetoric, and dialectic, and the quadrivium (q.v.) arithmetic, astronomy, geometry, and music. The study of the quadrivium was of a most superficial character, while that of the trivium was formal, with no appreciation of the spirit of the Latin literature and no devotion to classical ideas. The humanistic movement reached the German states during the last quarter of the fifteenth century and soon modified not only the culture of the universities, but also the work of the secondary schools. Probably the first schools to respond to the new influences were those of Nuremberg, which were modified in 1485 and again in 1496. It was not till 1521, however, that this movement was complete, and instruction in Greek and Hebrew added, thus constituting a true humanistic school. Meanwhile the Protestant Reformation had begun, and for the time being coincided in its educational aspects with the earlier Renaissance movement. In addition to instruction in classical Latin and Greek, the Reformation influence favored the consolidation of existing schools into stronger centralized ones, or even into complete systems extending over an entire state, and also the placing of these under secular control.

The first Protestant school of the humanistic type was that of Magdeburg, established in 1524. About the same time Melanchthon formulated his "school plan" providing for both Greek and Hebrew, at least for the favored few, and this plan became the basis of most of the Protestant schools of Germany. The first general system of schools which provided for the Gymnasia was that of Saxony, formulated in 1528, but without providing for Greek in such schools until a later date. The Gymnasium most influential as a type was that of Strassburg, founded (or modified) in 1538, under the headship of Johannes Sturm (q.v.). Only of slightly less importance were the Gymnasium of Goldberg under Trotzendorf and that of Ilfeld under Neander. The Protestant movement for the establishment of Gymnasia may be said to have culminated in 1580 with the establishment of the revised school plan of Saxony. From 1540 on, the Jesuit Order established numerous schools that were similar to the Gymnasia in all respects save in their religious instead of secular control. The rivalry between these types of schools, together with the change in the character of the Reformation movement, which eliminated the earlier sympathy shown with humanism, was responsible for the decline in the character of the Gymnasia. Instruction became most formal, little interest was shown in the content of ancient literature, scholasticism was rehabilitated, and the sympathies of the masses were alienated. Such remained the condition throughout the seventeenth century. During the last decade of that century and the earlier part of the eighteenth the Pietistic movement put new life into education. This change in spirit and motive of education, and the substitution of a more vital interest in the study of classics in place of the existing formalism, culminated in the formation of a new type of school—the Realschule (q.v.), for those who were not destined for the learned professions, the best known and one of the earliest being that of Johann Julius Hecker (q.v.), opened in Berlin in 1747. The Prussian monarchy exerted throughout the eighteenth century, especially under Frederick the Great, a quickening influence on education. But it was not till the latter part of that century, under the leadership of such men as Herder, Kant, Lessing, Goethe, and Schiller, that there was infused the new humanistic spirit that has characterized the German Gymnasia from that day to this. During the past century, particularly, the needs of an age devoted more to the material than to the ideal, as well as the rapid rise to importance of mathematical and natural science, could not fail of influence or be left without due provision. Yet even now the chief subject of gymnasial teaching is the pursuit of the humanities—i.e., the study of classical antiquity, the two languages of which, Latin and Greek, form the foundation of the teaching and study of the Gymnasia. Still, while retaining this foundation, the strongest efforts are no longer directed, as in former times, towards the most exact familiarity possible with the languages per se, but the introduction of the students into the spirit of antiquity is made of prime importance; and hence the ancient writers are treated not so much with reference to their grammar and style as to their general human, moral, and æsthetic significance. In the lower classes, naturally, a certain formal strictness is indispensable for strengthening the linguistic foundation, for sharpening the perception, and developing a clear, logical method of thought, for which nothing else is so well adapted, according to the German view, as the structure of Latin grammar.

The character of the Gymnasium is best seen through a statement of the entire system of higher schools in Prussia. The Gymnasia include a nine-year course, with both Greek and Latin; the Progymnasia are similar schools of six or seven year courses; the Realgymnasia give a nine-year course, with Latin, but no Greek; the Realprogymnasia, similar courses of six or seven years' length; the Oberrealschulen offer a nine-year course, with neither Latin nor Greek; the Realschulen, or burgher schools (Bürgerschulen), are similar schools, with six-year courses only. The burgher school in many of the German states is simply a higher elementary or intermediate school with one or two years and a few new subjects added to the ordinary course. The organization and curriculum of the Gymnasium in the various states of Germany present many points of difference, but in essential characteristics there is unity throughout, so that students can be transferred from one to another without interruption of their work. The Gymnasium embraces nine classes, or one-year courses—Sexta, Quinta, Quarta, lower and upper Tertia, lower and upper Secunda, lower and upper Prima. Pupils are admitted to Sexta at 9 or 10 years of age and are required to have a knowledge of reading, writing, and arithmetic. Latin is the basis of instruction from the beginning. In the Prussian schools eight hours a week is given to it for the first five years, seven for the next four. The emphasis on Latin is much greater in the other states than in Prussia, where the entire course calls for 68 week hours in this subject, while in Württemberg it is 81. The official programme of 1901 expresses the aim of Latin instruction thus: "On the sure basis of grammatical training to enable boys to understand the more important writers of Rome, and thus to introduce them to the intellectual life and culture of the ancient world." In the Realgymnasium the purpose is stated to be the comprehension, based on accurate grammatical knowledge, of the easier works of Roman literature. Latin essays are no longer required. Reading begins in the Quarta with Cornelius Nepos and Phædrus; in the Tertia, Cæsar and Ovid; in the Secunda, Cicero, Livy, Sallust, and Vergil; in the Prima, Cicero, Tacitus, and Horace; sometimes extracts from Catullus, Tibullus, and Propertius, and, exceptionally, Terence or Plautus. Greek in the fourth year (Lower Tertia) occupies six hours a week in each class. The grammar is finished in the fourth year; the authors read are the following: First, Xenophon; then, in the Secunda, Homer's *Odyssey*, Xenophon, Herodotus, and Lysias; in the Prima, Homer's *Iliad*, Demosthenes, Thucydides, and Plato, extracts from the lyric poets: of the tragic poets, Sophocles and Euripides, rarely Æschylus. Besides the authors named various others are not excluded, as Isocrates, Plutarch, Arrian, Curtius, Quintillian.

A change, revolutionary in character, which to a great degree breaks down the distinction between the Gymnasia and the Realgymnasia, was introduced in 1901 and 1902, as a result of the conflict begun some 10 years previously, under the leadership of the present Emperor, and waged for the modernization of the higher curriculum. This change is the introduction of English into the gymnasial course and making Greek elective. This is the most far-reaching change made since the introduction of the Realschulen. In 1901 the higher professions, save that of the ministry, were opened to those who had no knowledge of the Greek language, but who possessed in its stead a corresponding knowledge of modern languages. A strong tendency away from the Greek immediately made itself felt. The school which gave the necessary languages, Latin, French, English, was the Realgymnasium. But there were in Prussia (in 1898) 277 Gymnasia and only 67 Realgymnasia, and hence such a shifting of clientage would have been injurious to both schools. Moreover, the character and amount of the instruction in Latin in the Realgymnasia is inferior to that of the Gymnasia. Hence some modification of the gymnasial curriculum was necesssary. Then followed the introduction of English and the placing of Greek on an elective basis.

The great difference existing between the Gymnasia and the Realgymnasia is still that of the respective emphasis on the classics. A much greater time is given to the study of Latin in the Gymnasia and to science in the Realgymnasia. Both French and mathematics receive greater attention in the Realgymnasia. In the Gymnasia, French begins in the third year (Quarta) with four hours a week; later, two; and three in the last four years. A reform has taken place in the method of instruction in the last few years, and more attention is given to oral expression than formerly. The reading embraces the classical and the most important of other poets and prose writers. German is given four to three hours with the following course: in the lower classes, mythology, grammar, and explanation of poetical works; in the middle classes, rhetoric, poetics, and the reading of easy plays and larger poems; in the Prima, the history of German literature, reading of the *Nibelungenlied* and Walther von der Vogelweide, with the most important works of the classical period, especially Lessing, Schiller, and Goethe, and some introduction of Shakespeare. Hebrew and English are elective and are given two hours a week. The recent change has given much more time to English. Mathematics has four hours throughout, except in Tertia, where it has only three, and includes geometry, mensuration, plane and spherical trigonometry, stereometry, and the elements of analytical geometry; in arithmetic, the fundamental operations, equations of the first and second degree, arithmetical and geometrical computations, compound interest and stocks, combinations, the theory of probability, and the binomial theorem. The natural sciences have throughout two hours and embrace descriptive natural history, zoölogy and anthropology, botany and mineralogy, physics, mathematical geography, and an introduction to astronomy and chemistry. History receives two hours in the lower middle classes and three in the upper. The matter is so divided that the whole passes twice before the pupil—in the Quarta, ancient history; in the Tertia, mediæval and modern; in the Secunda, the history of Greece and Rome for the second time; and in the Prima, general history, from the migrations of the nations to the present time, with special reference to German history. Geography has two hours in each of the lower classes, one in the Tertia and Untersekunda, with a review of the subject in the upper classes in connection with history. Sexta and Quinta have each two hours of penmanship. Religion (separately, according to creed) has two hours throughout, except in Sexta, where it has three hours. Singing and drawing have each two hours; the last branch is not pursued in the four upper classes. Three hours a week are given in every class to gymnastics.

The number of hours of teaching averages 30 to 35 per week. The instruction is given from 8 to 12 A.M. (intermission at 10 o'clock) and from 2 to 4 or 5 P.M.; the afternoons of Wednesday and Saturday are free. For home preparation one to two hours are required from the lower classes, two to three hours from the upper. Vacations occur at Christmas, Easter, sometimes at Whitsuntide, and the longest in the autumn, altogether 11 weeks. At the end of the school year (generally at Easter) formal public closing exercises are held, with the announcement of promotions and distribution of prizes to the best scholars. A pupil who has in no report the note "unsatisfactory" is transferred to the next higher class. If two branches are unsatisfactory, he is required to pass through the same class again, in Prussia even with one "unsatisfactory." In southern Germany in such a case a reëxamination in the study after vacation determines his remaining or advancement.

As the Gymnasia are only very seldom boarding schools (*Internate*), the maintenance of discipline outside of school is accomplished by certain regulations, which, however, allow scholars of the Prima somewhat greater freedom. The punishment for transgressions is arrest, imprisonment, or the *consilium abeundi*, which is followed at the next offense by expulsion. Each class is in general limited to 40 students, and when that number is exceeded parallel divisions are formed. Since many Gymnasia have 700–800 pupils, all their classes contain two, sometimes even three, divisions. Each class is under the special supervision of a class teacher, or Ordinarius, who teaches the chief branches in that class. At the head of the Gymnasium is a Direktor. The directors are themselves responsible to an Oberschulrat, or Oberstudienrat (Board of Education), in Prussia the Provinzialschulkollegium, and the latter to the Ministry of Public Worship and Instruction. Conferences of the directors and higher school officials act on questions of instruction, and determine changes in method, conditional upon the Imperial sanction.

The higher schools are primarily state institutions; some are also municipal. The state supervises the schools by inspections, appoints and pays the teachers, who bear in the south the title of Professor, in the north that of Oberlehrer; but specially deserving teachers in Prussia also receive the title of Professor. Younger teachers, from their state examinations to their definite appointment, bear the title of Lehramtspraktikant or Probekandidat (probationary instructor). Teachers without academic education are employed only for arithmetic, natural history, penmanship, and the special branches, drawing and gymnastics. The instruction is not free: the state receives a tuition fee of 60–120 marks, according to the class. At the completion of the gymnasial course the examination for graduation (Arbiturienten- or Maturitätsprüfung) is held under the direction of a state commissioner and is judged very severely. The successful candidates receive the certificate of fitness for the university. The privilege of granting this certificate belonged formerly to the Gymnasium alone, but since 1902 the graduates of the other nine-year schools have the same privileges, with the exception that Latin is required of students of medicine, and Latin and Greek of students of theology. The other higher schools fit for the great technical schools. A privilege quite as highly prized as that of fitness for the university, and one that is to a great degree responsible for the large attendance and public support of the secondary schools, is the exemption from one year of the required two years' military service on successful completion of the six-year course. Nearly one-half of all secondary pupils in Prussia leave school at the end of six years after securing this privilege (*Einjährigenschein*). This privilege also explains the formation of the Progymnasium, which offers simply the first six years of the gymnasial course. The Realgymnasium differs from the Gymnasium in the stronger emphasis on the nonclassical subjects, as is seen in the greater number of hours given to mathematics and the sciences, and the fewer hours given to Latin, in the omission of Greek, and in the requirement of English as well as French. The Realschulen (q.v.) and the Oberrealschulen are altogether nonclassical. Every higher school has a well-endowed school library and a teachers' library and publishes at the end of each school year a Programme, which is, first, a handbook of school information records, vacations, and lists of students, and, second, contains a scientific treatise written by a teacher of the school.

In essential unity of method and in the equal supervision of the state, the higher schools as a whole stand on the same plane of excellence, although one or another institution may occasionally enjoy a position of preëminence through the influence of a specially gifted director or a happily constituted faculty, as, e.g., in Prussia the Landes- und Fürstenschule Pforta (Foundation school), in Saxony the Landes- und Fürstenschulen at Meissen and Grimmen, all founded previous to the middle of the sixteenth century, in Württemberg the "élite" schools of the upper Gymnasia (without lower classes), in which only pupils of marked excellence are received—e.g., at Maulbronn. Some of these most noted institutions are boarding schools. In 1913 there were in Germany 1390 secondary schools for boys, of which 516 were Gymnasia and 220 Realgymnasia. In addition there were 34 Gymnasia for girls—a recent development. Consult: Matthew Arnold, *Higher Schools and Universities in Germany* (2d ed., London, 1882); Schrader, *Erziehungs- und Unterrichtslehre für Gymnasien und Realschulen* (5th ed., Berlin, 1893); Paulsen, *German Education, Past and Present* (trans. by Lorenz, New York, 1908); Russell, *German Higher Schools* (new ed., ib., 1907); Bolton, *Secondary School System of Germany* (ib., 1900); *Special Reports on Educational Subjects by the Board of Education of Great Britain*, vols. i, iii, and ix; W. Lexis, *Das Unterrichtswesen im deutschen Reich*, vol. ii (Berlin, 1904); id., *Die Allgemeinen Grundlagen der Kultur der Gegenwart* (ib., 1906); A. Beier, *Die höheren Schulen in Preussen und ihre Lehrers* (Halle, 1909); J. F. Brown, *The Training of Teachers for Secondary Schools in Germany and the United States* (New York, 1911). See National Education, Systems of; Realschulen.

GYMNA'SIARCH (Lat. *gymnasiarchus*, from Gk. γυμνασίαρχος, *gymnasiarchos*, from γυμνάσιον, *gymnasion*, gymnasium + ἀρχός, *archos*, leader, from ἄρχειν, *archein*, to lead). The name of a Greek official, whose rank and duties varied widely in different places and at different times. In Athens during the fifth and fourth centuries B.C. a gymnasiarch was chosen annually from each tribe to bear the expenses of the torch races. (See Lampadephoria.) The duties included the payment of all expenses connected with the training of the competitors, and the office was one of the most expensive of the public services demanded by Athens of her wealthy citizens. The name seems to imply that the gymnasiarch had also certain rights and duties in the gymnasia during the training of the youths, but there is no definite information on this subject. After the establishment of the Macedonian power we find a change at Athens. There is now one gymnasiarch chosen annually, and his office is one of great dignity. He has the general oversight of order and discipline in the gymnasium of the ephebi (see Ephebus), sometimes undertaking heavy expenses from his own purse. The same name is given to rich ephebi who undertake for a longer or shorter period, generally one month, to bear certain heavy charges for their comrades, such as the expenses of festivals or of furnishing the oil needed in the gymnasium. Outside of Athens and the states which copied her gymnastic system, the term denotes either magistrates who have charge of the gymnastic and literary instruction or those who have to provide for certain expenses connected with the gymnasium or festivals, either from their own property or from the public funds. The wide diversity in details cannot be discussed here. Consult Glatz, "Gymnasiarchia," in Daremberg et Saglio, *Dictionnaire des antiquités* (Paris, 1896); Gardiner, *Greek Athletic Sports and Festivals* (London, 1910); Oehler, "Γυμνασίαρχος," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Munich, 1912).

GYMNA'SIUM, Greek. See Athletics; Education, *History of the Theory of Education*.

GYMNAS'TICS (Lat. *gymnasticus*, from Gk. γυμναστικός, *gymnastikos*, relating to athletic exercises, from γυμνάζειν, *gymnazein*, to train). Systematic exercise undertaken for the preservation of health and the development of strength, skill, and the sturdy qualities that go with them, or for the pleasure of activity and as a means of social enjoyment. Apparatus of some sort is usually employed, and in most cases a teacher is present to direct and oversee. An outdoor space, or a room or building set apart for such purposes and furnished with the necessary appliances and paraphernalia, is termed a gymnasium. In contrast with athletics, the idea of competition or of mere recreation is commonly a subordinate one. The systematic and progressive training of the gymnasium furnishes the best preparation for participation in vigorous games and competitive sports. Gymnastics occupied a preëminent place in the life of ancient Greece, but died out with the decay of that nation. As practiced to-day, it dates only from the last quarter of the eighteenth and the first quarter of the nineteenth century. Its widest spread and most rapid development belong to the last 50 or 75 years and must be viewed as a product or result of modern life and conditions. The movement of population from the country and small towns into crowded cities and the introduction of machinery in the industrial world have lessened the demand upon human muscles and increased that made on the nervous system and the mind. They also require a lifetime spent under conditions frequently injurious to health and unfavorable to good physical development. The provision of some sort of motor activity, in suitable surroundings, has therefore become an absolute necessity to the individual and a subject of serious importance to the nation at large. At present gymnastics forms an integral part of the educational system of continental Europe, receiving its original impetus in German-speaking and Scandinavian countries and reaching its highest development there. It has also been introduced into the grade and high schools of many American cities and forms a part of the curriculum in nearly all colleges and universities.

Indiscriminate gymnastic exercises are rarely beneficial and frequently injurious if indulged in by any one who is not qualified by physical capacity, or who has not the knowledge or experience necessary for profitable practice. A medical examination is always a wise preliminary to a course of work in the gymnasium, and a physical director or instructor in gymnastics is now a regular officer in every modern gymnasium.

Exercises performed without apparatus of any sort (*free gymnastics*) are usually borrowed from the material of medical gymnastics, or they are patterned after some actual occupation or form of sport or other kind of activity which makes an appeal to the imagination. The favorite pieces of *hand apparatus* are the wand, the Indian club, and the wooden or iron dumbbell—the former weighing about a pound and the latter seldom over three pounds. Suitable movements are often combined into an orderly series ("drill") which lends itself to rhythmical performance, with or without a musical accompaniment. *Pulley-weight* machines, the use of which became general in American gymnasia 25 years ago and is peculiar to them, allow the adjustment of resistance to strength and the development of any desired group of muscles. By varying the height of the handle, or the character of the attachment, or one's position at the apparatus, the effects can be localized at will, as suggested by the names given to the different modifications: chest weight, high pulley, low pulley, foot machine, leg pulley, wrist machine, neck or head machine, traveling parallel, quarter circle, and rowing machine. Another form of rowing machine and the wrestling machine are friction appliances, capable of regulation to suit the strength of the user.

The *fixed apparatus* of the gymnasium, aside from the wall varieties just mentioned, is most of it intended either for jumping and vaulting exercises, or for hanging, swinging, and climbing exercises, or for both of these uses. The older form of horizontal bar is usually made of steel, or of hickory with a steel core, and is about 6 feet long, round, and thick enough to be readily and tightly grasped. It may be suspended from the ceiling at a fixed height, or so arranged that it can be adjusted to any height by sliding it up or down the upright posts to which it is attached. The Swedish form (also called *bom*, or *boom*), intended primarily for class use, has an adjustable bar about 12 feet long, heart-shaped on section, and a second narrower bar sharp on one edge and flat on the other. These can be used separately or together, and detachable wooden "saddles" are also provided for the thicker bar. Parallel bars are two oval or round bars supported side by side on posts at a distance of 18 or 20 inches, and preferably made adjustable for both height and width. The vaulting horse, made of wood covered with leather and supplied with pommels fixed on the back saddlewise, is still sometimes shaped so as to resemble its prototype somewhat, but more commonly neck and rump are indistinguishable. The buck is merely a short horse without pommels, and the vaulting box, with detachable sections, permits many of the same exercises where firm grasp is not essential. Flying rings are two leather-covered iron rings suspended from above by ropes. Traveling rings consist of a number of such rings arranged in a row so that, commencing with the first one, the performer may swing himself to the second, after which he lets go of the first, and so on down the line. Stall bars are a series of ladder-like structures with the rounds placed about 6 inches apart and each "stall" from 2½ to 3 feet wide, placed vertically against the wall and used for a great variety of exercises. Movable benches are often employed in connection with them. Other fixed apparatus includes vertical, horizontal, and oblique ladders, and vertical and oblique ropes and poles. The trapeze is less frequently used nowadays, and the giant stride is intended especially for children. Long thin mattresses of felt covered with canvas are employed for tumbling and to break the jar in vaulting. Provision is also commonly made for indoor games, such as basket ball, indoor baseball, volley ball, and the like. In American gymnasia a gallery with a padded running track, inclined at the turns, will generally be found encircling the main room.

The term *Swedish gymnastics*, as applied in America, still suggests to most persons either the exercises of the "movement cure" or medical gymnastics, first brought to this country a few years before the opening of the Civil War, or else a series of more or less monotonous exercises without apparatus performed in unison by pupils at the command of the teacher. Either view involves an error and does injustice to the Swedes. Pehr Henrik Ling (1776–1839) opened the Royal Central Institute of Gymnastics in Stockholm in 1814, with the idea of preparing teachers for the army and the schools and of applying exercise also in the treatment of deformity and disease. During the remainder of his lifetime he brought *military* gymnastics, including especially fencing with the foil, sabre, and bayonet, to a high degree of perfection. Branting, who was director from 1839 till 1862, devoted himself chiefly to the development of *medical* gymnastics, and during his term of office German and other foreign physicians began to visit Stockholm to study the new methods. Through their reports and in other ways the "movement cure" was soon widely heralded, and even now is regarded by many as synonymous with the Ling or Swedish gymnastics in its entirety. Ling's son, Hjalmar Fredrik Ling (1820–86), one of the teachers at the Institute from 1858 till 1882, gave to Swedish *school* gymnastics its present characteristic features, devising new forms of apparatus and arranging it for the use of large numbers at once, and elaborating a lesson plan commonly referred to as the "day's order." He used no hand apparatus, but a great variety of fixed apparatus—the long double horizontal bar, or *bom*, described above, the stall bars and benches, vaulting box, ropes, a peculiar ladder that suggests latticework, the horse and buck, etc. His lesson plan was an attempt to analyze school conditions, ascertain the needs of the pupil at different stages, select exercises and devise apparatus to meet those needs, and arrange the material progressively in groups which were each aimed at a definite goal, and then combine the groups into a complete lesson scheme. One who visits the secondary schools of Sweden, or the elementary schools in larger towns and cities, will find fixed apparatus as freely and universally used as in German, Swiss, or American school gymnasia. Unless circumstances compel it, such a thing as a lesson composed of "free gymnastics" is seldom seen in Sweden.

Towards the close of the last century much was said and written in America regarding *Delsarte gymnastics.* But François Delsarte (1811–71) was a teacher of emotional expression through voice and gesture, and not the inventor of a system or method of gymnastics. "Relaxing" exercises and training in poise and in control of the breath form a part of the necessary preparation for effective appearance on the platform or the stage; but complete physical education of the growing child and youth could never be accomplished by such means, and the adult requires a much broader range of motor activities.

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GYMNEMA, jĭm-nē′mȧ (Neo-Lat., from Gk. *γυμνός*, *gymnos*, naked + *νῆμα*, *nēma*, thread), or Cow-Plant, *Gymnema lactiferum.* A climbing perennial shrub of the milkweed family, native of the East Indian Archipelago, the milky juice of which has been said to be used by the natives as a substitute for milk and cream, but which is believed to contain enough of the poisonous principle peculiar to the order to cast a doubt upon its reputed use.

GYMNOCLADUS, jĭm-nŏk′lȧ-dŭs (Neo-Lat., from Gk. *γυμνός*, *gymnos*, naked + *κλάδος*, *klados*, branch). A genus of leguminous trees. *Gymnocladus dioica* is a North American tree, found in rich bottom soils from the eastern United States as far south as Tennessee and west to Oklahoma and Nebraska. It attains a height of 50 to 60 feet in cultivation, or 75 to 100 feet when growing wild. It is remarkable for its upright branches and its exceedingly rough bark. The leaves of young trees are very large and bipinnate. The flowers are white in short spikes. The pods are 5 inches long and 2 inches broad. The tree is called chicot in China, where a second species (*Gymnocladus chinensis*) is found, and sometimes stump tree, from its dead appearance in winter and the absence of conspicuous buds. It is one of the last trees to put out its leaves, which are very ornamental when young. Its common name, Kentucky coffee tree, was applied because its seeds are said to have been formerly washed and ground as coffee in Kentucky. The wood is used both by cabinetmakers and carpenters. It has very little sapwood. The pods, preserved like those of the tamarind, are said to be wholesome and slightly aperient. See Plate of Ginkgo.

GYM′NODON′TES (Neo-Lat. nom. pl., from Gk. *γυμνός*, *gymnos*, naked + *ὀδούς*, *odous*, tooth). A suborder of plectognath fishes, which includes the puffers, sunfishes, porcupine fishes, globefishes, and the like. These forms have no separate teeth, but the jaws are enveloped by an enamel-like covering. Many of them have the power of inflating their bodies, probably for protection. (See Globefish.) There are many species, mostly found in the warm seas.

GYM′NONO′TI (Neo-Lat. nom. pl., from Gk. *γυμνός*, *gymnos*, naked + *νῶτος*, *nōtos*, back). A suborder of eel-like fishes of the fresh waters of South America, named from the electric eel (see Electric Fish), formerly called Gymnotus. The group embraces two families, regarded as being between the true eels and the eel-like siluroids (Clariidæ).

GYMNOPÆDES, jĭm′nō̇-pē′dēz. See under *Plumage*, in the article Bird.

GYM′NOPHI′ONA (Neo-Lat. nom. pl., from Gk. *γυμνός*, *gymnos*, naked + *ὄφις*, *ophis*, serpent). An order of small snakelike amphibians, with no trace of limbs or tail. The body is vermiform, the skin hardened to form scales, the eyes rudimentary, and the membranous skull complete and substantial. They are tropical burrowers and number about 42 species, principally of the family Cæciliidæ. See Blindworm.

GYMNOS′OPHISTS (Lat. *gymnosophistæ*, from Gk. *γυμνοσοφιστής*, *gymnosophistēs*, naked sage, from *γυμνός*, *gymnos*, naked + *σοφιστής*, *sophistēs*, sage, from *σοφός*, *sophos*, wise). The name given by the Greeks to those ancient Hindu philosophers, or religious devotees, who wore little or no clothing and dedicated themselves to mystical contemplation and the practice of the most rigorous asceticism. They often adopted a solitary life in the forest, for which reason the Greeks termed them also *Hylobioi*, answering to *Vāna-prasthās* of the Sanskrit literature. They correspond to the yogis, fakirs, or "holy men" of India to-day. According to Strabo there were two classes of these, the Brahmans and the Samanæans. The former adhered strictly to the rules of caste distinction; the latter did not. Calanus (q.v.), who allowed himself to be burned alive, was a type of these naked philosophers.

GYMNOSPERMS, jĭm′nō̇-spērmz (from Gk. *γύμνός*, *gymnos*, naked + *σπέρμα*, *sperma*, seed). One of the two great divisions of seed plants (Spermatophytes) (q.v.). The Gymnosperms have exposed seeds, and the Angiosperms have seeds inclosed in a case. The Gymnosperms are very ancient and form a comparatively small part of the present seed-plant vegetation, but they were the only seed plants from the early Paleozoic until the appearance of Angiosperms sometime during the Mesozoic. Seven great groups of Gymnosperms are recognized, as follows:

Cycadofilicales. This is the primitive group of Gymnosperms and is known only in the Paleozoic and chiefly in the Carboniferous. Until recently all these plants were thought to be ferns, the evidence from their leaf forms and venation appearing to be conclusive. However, they are now found to be seed-bearing, so that the so-called fern vegetation of the coal period is the primitive Gymnosperm vegetation. These Gymnosperms resemble ferns so closely that they cannot be distinguished except when seeds are attached. These seeds are borne in the same relation to the leaf that the fruit dots hold to the fern leaf. The connection of this group with the very early ferns is quite evident.

Cordaitales. Associated with the Cycadofilicales in the Paleozoic were the Cordaitales, which were once thought to be the only representatives of the Gymnosperms during the Paleozoic. The group was evidently derived from the Cycadofilicales, but was of very different habit. They were tall and slender trees, with a dense crown of branches bearing a great abundance of simple and large leaves. Their advance is also shown in the presence of cones in which the seeds are borne and also in the abundance of secondary wood.

Bennettitales. This extinct group of Gymnosperms was very conspicuous during the Mesozoic, and they have been called fossil cycads. Recent investigations have shown, however, that they are very distinct from the living cycads. They were extraordinarily abundant during the Jurassic, and many remains have been found in North America, Europe, and Asia. The richest display of forms occurs in the United States. The stem is either tuberous or short columnar and in either case bears a crown of large, fernlike leaves. The group is distinguished by bearing the cones on numerous small branches that issued from the trunk of the stem, and also in the fact that the cones contain both the stamens and the ovules.

Cycadales. The cycads are the living representatives of the Mesozoic Bennettitales. They are tropical plants, including about 100 species, distributed almost equally between the Oriental and Occidental tropics. The stem is tuberous or columnar, covered by an armor of leaf bases, and bearing a crown of large, fernlike leaves and a terminal cone. The plants are diœcious; i.e., the staminate cones and ovulate cones are upon different plants. Cycads are the most fernlike of living Gymnosperms.

Ginkgoales. This is a very ancient group, connected with the Cordaitales of the Paleozoic, displayed extensively throughout the world during the Mesozoic, and represented at the present time by a single living species. In all probability this species has been kept alive because of its extensive cultivation by the Chinese and Japanese in connection with temple worship. *Ginkgo*, or maidenhair tree, has become somewhat extensively cultivated in this country as an ornamental tree. It resembles a conifer in habit, but the leaf is very characteristic in form and veins, the broadly wedge-shaped outline, often more or less lobed, and the forked veins resembling somewhat the pinnules of maidenhair fern.

Coniferales. This is the largest group of living Gymnosperms, comprising approximately 350 species. In contrast with the tropical distribution of the cycads, the conifers are characteristic of the north and south temperate zones, where they often form conspicuous forest masses. The group as a whole has been derived from the Cordaitales, and during the Mesozoic split up into six distinct tribes, which form the conifer vegetation of the present time. These tribes are as follows:

1. *Abietineæ.* This tribe includes 9 genera and about 140 species, including pines, spruces, firs, hemlocks, larches, and cedars, the large genus being *Pinus*, with about 80 species. This is the characteristic Gymnosperm forest group of the north temperate latitudes.

2. *Araucarineæ.* A tribe characteristic of the Southern Hemisphere, known as the Araucarians, or Araucarian pines. Only 2 genera are known, including about 20 species, which are as characteristic of the south temperate regions as the pines are of the north temperates. One of the genera (*Agathis*) includes the well-known Kauri tree of the Australasian region, as valuable a lumber tree for that region as is the white pine of the northern latitudes.

3. *Taxodineæ.* This tribe includes about 8 genera and 15 species, the characteristic American genera being *Sequoia* (redwood) and *Taxodium* (bald cypress).

4. *Cupressineæ.* In this tribe, with 9 genera and about 80 species, are included the cypress, arbor vitæ, and junipers, the large genus being *Juniperus*, with about 30 species. This tribe is peculiar among conifers in its whorled leaves.

5. *Podocarpineæ.* The podocarps in general are south temperate forms, *Podocarpus* being the largest genus, with about 65 species, and is as characteristic of the Southern Hemisphere as are the pines of the Northern Hemisphere.

6. *Taxineæ.* The taxads in general are north temperate, the yew tree and ground hemlock (*Taxus*) being the most widely distributed genus.

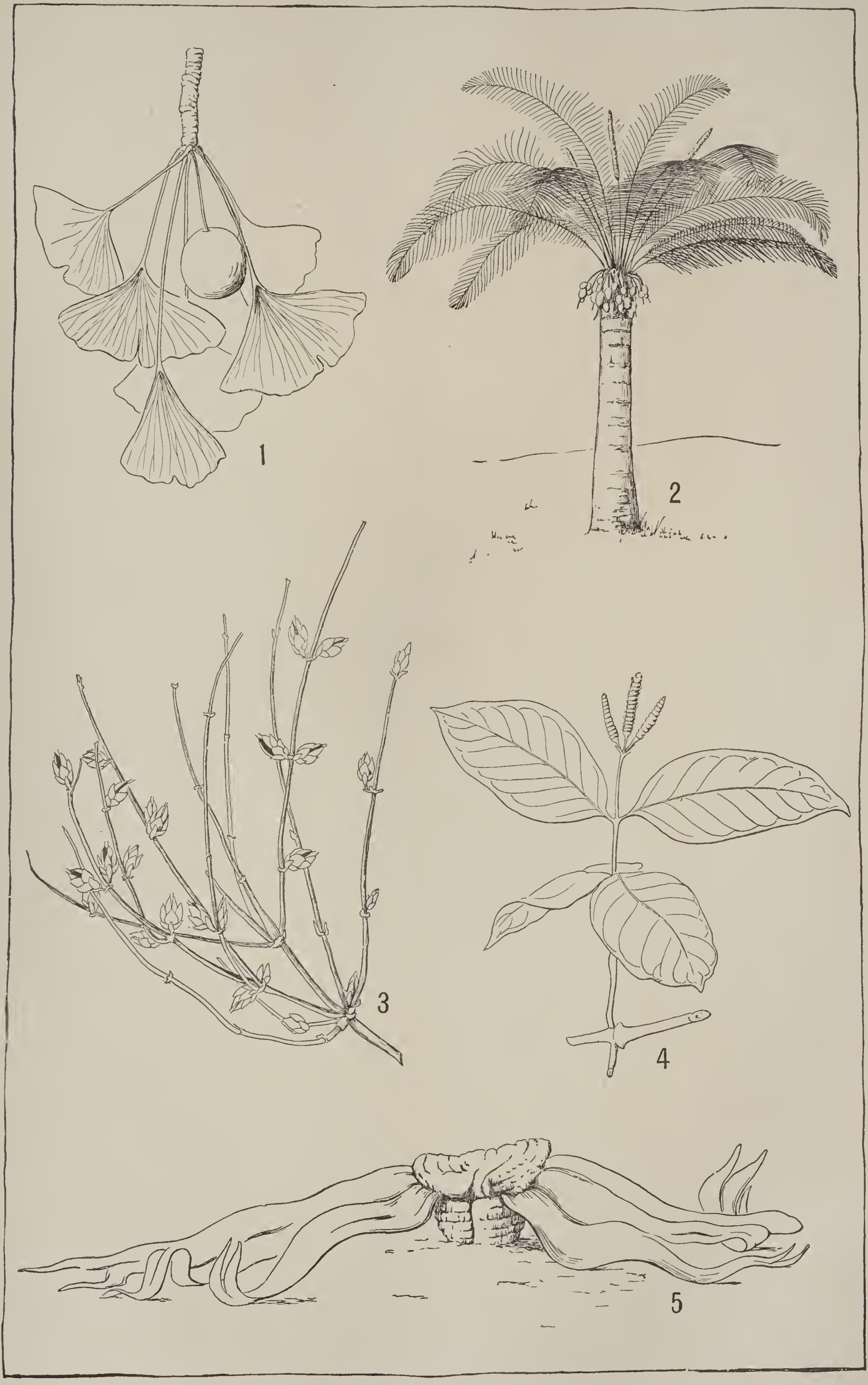
Gnetales. This group comprises three remarkable and very distinct genera. *Ephedra* is a genus of about 50 species, distributed throughout the arid regions of the Mediterranean basin and adjacent Asia, and also in the arid regions of western North America and South America. They are straggling shrubs, with long-jointed and fluted green stems, and scalelike opposite leaves, forming at each joint a two-toothed sheath. The genus *Welwitschia* is represented by a single species in the arid districts of western South Africa. It has a huge, woody, turnip-shaped body, whose crown bears a single pair of elongated strap-shaped, parallel-veined, and persistent leaves. The genus *Gnetum* comprises about 15 species, distributed throughout the tropics of both hemispheres. They are small trees or woody twiners, with leathery, net-veined, opposite leaves, resembling those of Dicotyledons. There is no record of Gnetales as fossils, and therefore all the evidence available indicates that they are relatively modern among Gymnosperms.

In addition to the books cited under MORPHOLOGY, all of which treat more or less fully of this group, consult Coulter and Chamberlain, *Morphology of Gymnosperms* (Chicago, 1910).

GYMP. See GIMP.

GYMPIE, gĭm′pĭ. A gold-mining town of March Co., Queensland, Australia, on upper Mary River, 107 miles north of Brisbane by rail

GYMNOSPERMS



1. GINKGO
2. CYCAS
3. EPHEDRA
4. GNETUM
5. WELWITSCHIA

(Map: Queensland, H 9). In the vicinity are valuable mineral deposits, including coal, all as yet undeveloped. Pop., 1901, 11,959; 1911, 12,419.

GYNÆCEUM, jĭn′ḗ-sē′ŭm (Lat., from Gk. *γυναικεῖον*, *gynaikeion*, women's apartments, from *γυναικεῖος*, *gynaikeios*, relating to women, from *γυνή*, *gynē*, woman). The apartments for women in ancient Greek houses, distinguished from the *andron*, the apartments for men. In the fourth century A.D. and later, the term was applied to large factories where slaves of both sexes wove and made up clothing of fine stuffs for the Imperial families and also of coarser materials for the soldiers. These factories were in direct dependence on the Emperor and under the supervision of Imperial officers. Procopius uses the term *gynæconitis* to indicate the place reserved in the Eastern church for women.

GYNÆCOLOGY, jĭn′ḗ-kŏl′ṓ-jĭ (from Gk. *γυνή*, *gynē*, woman + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). That branch of medicine which treats of diseases and affections peculiar to the physical organization of women. All operative work upon the female genital apparatus is called gynæcological surgery. But childbirth and the care of the parturient woman belong to the domain of OBSTETRICS (q.v.). Consult Dudley, *Practice of Gynecology* (New York, 1914).

GYNÆCONITIS. See GYNÆCEUM.

GYNOMEHRO. See POMO.

GYOMA, dyō′mō. A town of Hungary, in the County of Békés, situated on the Körös, about 114 miles east-southeast of Budapest by rail. The country is extremely fertile and produces much grain and fruit. Cattle and sheep are raised in considerable numbers; wine, bricks, and cereals are made, and the fishing is also important. Pop., 1900, 11,541; 1910, 11,688, mostly Magyar Reformed.

GYÖNGYÖS, dyĕn′dyĕsh. A town of Hungary, in the County of Heves, situated on the Gyöngyös River, at the base of the Matra Mountains, about 60 miles northeast of Budapest (Map: Hungary, F 3). The town has a Gymnasium, a large Franciscan monastery, and a hospital of the Sisters of Mercy. It manufactures bricks, alcohol, copper goods, and spirits, and carries on a large trade in grain, cattle, and wine, the vineyards yielding the grape which produces the fine Erlauer wine. In the vicinity are excellent medicinal baths containing iron and alum. Pop., 1900, 16,442; 1910, 18,314, nearly all Magyar Catholics.

GYÖR, dyĕr, or **RAAB**, räb. A royal free city and the capital of the County of Raab, Hungary, 63 miles west by north of Budapest, at the confluence of the Raab with the Little Danube (Map: Hungary, E 3). It has many religious edifices and handsome new public buildings. The educational institutions include an Obergymnasium, a normal school for girls, a trade school, a priests' seminary, and training school for wood and metal workers. The city manufactures cloth, spirits, vehicles, matches, bricks, chemicals, oil, machinery, and agricultural implements. It has a good trade in hogs and grain, and the horse market is famous. It is the seat of a bishop. Györ was built on the ruins of the Roman Arrabona. It was taken by the Turks in 1594. Four years later they were driven out, and Györ was made a fortress of the first rank. Pop., 1900, 26,166; 1910, 26,849.

GYP, zhĕp. The nom de plume of the French writer Sibylle Gabrielle Marie Antoinette de Riquetti de Mirabeau, Comtesse de Martel de Janville. See MARTEL DE JANVILLE.

GYP′SIES. A singular race of wandering tribes, scattered through western Asia, all the countries of Europe, and northern Africa, and found, where the tide of modern immigration has flowed, in North and South America and in Australia. From the standpoint of ethnography and language alike they present one of the strangest problems with which modern scholarship has to deal. Dwelling in the midst of highly civilized nations, associating in the daily life of diverse peoples, they yet retain their physical and racial characteristics and their peculiar language wherever they may live. No similar phenomenon is to be observed in all the world. The nearest parallel is to be found in the Jews, who, also scattered among the nations of the earth, retain the distinguishing characteristics and customs of their race; but the Jews are numerous and powerful and have the influence of a long history and strong traditions, not to speak of the bond of their ancient religion. The gypsies, on the other hand, are isolated, unlettered, the despised of the earth, with no common bond of religion, history, or tradition. It is an unexplainable native instinct that holds them together in communities and roving bands, that keeps them apart from the rest of the world, and that drives them to endless, restless roaming. It is in their blood to love the open-air, nomadic life; and even where education or self-interest leads them here and there to adopt the settled habits of civilization, the old native instinct returns at times and forces them from house and town to the wandering life in the fields.

Name. In his own language a gypsy calls himself and his race *Rom* (i.e., man), *the man par excellence*, for all the rest of mankind he defines under the generic term *gäjo* (English-gypsy dialect *gąjo*, gentile). His wife is *romni*, and all that characterizes him and his ways is summed up in the term *romnipen*, while his language is *romani*. The gypsy of each country accepts the name applied to him by the people, but knows not what it means. These local names are as varied as the countries in which he lives; but if we except the many appellations of gypsy-like tribes in the East (the Luri and the Karachi in Persia, Nowars in Syria, Jāt and Sinti in India, etc.), of which but little is known, they may be reduced to three general categories: (1) those referring to the supposed origin of the tribe; (2) a group of allied names of uncertain etymology; (3) depreciatory appellations, such as "heathen" and "outcasts." Instances of the third class occur in Holland, where the gypsies are known as *Heidenen* (heathens), and in Egypt, where they are *Harami* (i.e., robbers). To the second group belong most of the appellations of eastern Europe and Germany. Early Byzantine writers (ninth to twelfth century) speak of the wandering tribes under the name *'Ατσίγκανοι*, *Atsinkanoi* (i.e., Touch-me-nots, since they feared to be defiled by the touch of other races whom they considered unclean), whence the gypsy in Turkey is to-day called *Chingiané*, in Bulgaria *Tsiganin*, in Rumania *Ţigan*, in Hungary *Czigány*, in Bohemia *Cinkān*, in Germany *Zigeuner* (Old German *Ziginer*, *Zigeiner*), in Italy *Zingaro*, and it may be possible that the

English word *tinker* is but a variation of the same term. To their emigration from the East we owe the first group of appellations; a very general, but wholly false, belief that they had wandered into Europe from Egypt led the Greeks to call them Γύφτοι, the Albanians *Jevk*, the Turks *Färäwni* (i.e., Pharaohs), the Hungarians *Faraonépe* (or Pharaoh's people), Spaniards *Gitanos*, and the English in olden times *Egipcions*, whence *Gypsies*. Similarly in Denmark, Sweden, and northern Germany they are designated as *Tatars*, and in France *Bohémiens*.

Origin and Ethnic Traits. Of their own origin the gypsies can give no sensible account. They are apt, at least those of western Europe, to follow the popular belief that they came originally from Egypt. Among the many authors that have written about them from the fifteenth century to recent times the most diverse and absurd theories have been advanced. A fanciful resemblance in their German name *Zigeuner* led early writers to trace them to Zeugitania (Tunis), or to Singara, in Mesopotamia. Others have sought to trace them to the Saracens, the Jews, the Amorites, the Canaanites, the Lost Tribes of Israel, or the "mixed multitude" that followed Moses out of Egypt. It was the comparison of their language that gave the first clue to their real origin. As early as 1776 a certain Captain Székely published a letter in a Viennese review, in which he mentioned that an Hungarian clergyman named Vâlyi, during his student days at the University of Leyden, had become acquainted with some fellow students from Malabar in India and had acquired from them a small vocabulary of Malabar words. On his return to Hungary he read his list to some gypsies, who understood almost every word. In 1783 two Germans, Rüdiger and Grellmann, writing on the gypsies, arrived independently at the conclusion of their Indian origin. The growing study of Sanskrit and the modern Indian languages drew further attention to that of the gypsies, and in 1844–45 Pott published a monumental work, *Die Zigeuner in Europa und Asia*, in which was fully set forth the Hindu origin of "romani." There can be no further question of the fact that the gypsies are an Indian race, and every step in the study of their language and racial type tends still more to confirm the fact. It is unnecessary here to treat in detail the many investigations of Bataillard, MacRitchie, De Goeje, Miklosich, and others, that seek to connect them closely with one or another of the wild tribes of northwestern India. A few words taken at random will serve sufficiently to show the Hindu origin of their language:

English	*Gypsy*	*Sanskrit*	*Modern Hind.*
coal	*angar (wangar)*	*angara*	*ungara, vangar*
two	*dui*	*dva, dvi*	*dō*
to do	*ker*	*kar*	*kurnā*
man	*manush (mush)*	*manushya*	*manus*
mouth	*mui*	*mukha*	*mukh*
nose	*nak*	*nasa*	*nak*
five	*panch*	*panchan*	*panch*
gentleman	*rai*	*rāja*	*rāja*
lady	*rani*	*rājni*	*rāni*
golden	*sonakai*	*svarna*	*sonakai*
four	*shtor*	*chatur*	*char*
three	*trin*	*tri*	*tiu*
hand	*wast*	*hasta*	*hath*
fire	*yag*	*agni*	*yag*
eye	*yak*	*akshi*	*ankh*
one	*yek*	*ēka*	*yek*

In appearance the full-blooded gypsy is rather undersized, with swarthy complexion, oval face, and regular features, often very handsome. He has very black hair, piercing dark eyes, white teeth, a lithe figure, and small hands and feet. Kopernicki studied 20 gypsy crania in a hospital at Budapest and found a very striking resemblance to the Hindu crania of low caste. The gypsy marries early. The young girls are often very beautiful, but their beauty soon fades. As a race, the gypsies are long-lived; it is not unusual to find very aged men and women, exceedingly wrinkled, but robust and active. They retain their deep-black hair until a great age.

Sketch of their Migrations. At precisely what period the gypsy hordes left their early home in northwestern India and commenced their long migration into the west cannot be determined. Historical information on this point is entirely wanting; but their language affords sure evidence of the course of their wanderings, for their sojourn in each country has left its impress on their vocabulary. In addition, we are so fortunate as to have some slight records of their early apparition among the nations of Europe. They must have left their original home not later than the beginning of the tenth century, and how much before it is quite impossible to say. Perhaps the irruption of the hordes of Genghis Khan moved them from their earlier abode and started them on their long march of centuries. They evidently took the direction of Kabulistan and Persia and made a lengthy stay in each of these countries, as the presence of Kabul and Persian words in their language amply proves. Here they seem to have split into two main divisions—the one striking south through Syria into Egypt and northern Africa, where their descendants are still to be found in considerable numbers; the other migrating west through Asia Minor into Turkey in Europe. According to Finck, however, the dialect of the Armenian gypsies is more closely related to Prakrit than that spoken by the European gypsies, while the gypsy dialects of Asia Minor and Syria, as a whole, are very different from those of Europe. This seems to show that the gypsies of Armenia and Syria represent a later migration than those of Europe. Greece and the Greek-speaking countries of southeastern Europe were their earliest abiding place on the European continent, and there is no way of deciding how many decades or centuries they roamed about here before pushing their restless way still farther to the west. As early as 1378 we have mention of a gypsy chief named John as established with certain feudal privileges at Nauplia, in the Peloponnesus, under Venetian rule; and numerous ruined castles in that country still bear the name Γυφτόκαστρον, or gypsy castle, from the name by which they are known in Greece, Γυφτοί, or Kopts. Earlier still, in 1370, we find feudal settlements of gypsies in certain parts of the island of Corfu—a sort of gypsy "ghetto," or reservation.

Early in this same century large bands of gypsies began to stream north from Greece and Turkey into the wild and scantily populated Balkan countries, especially Wallachia, where they found ample room to gratify their nomadic instincts unmolested, and throve and increased in numbers amazingly. From here they readily found their way in vast numbers into Transylvania and Hungary. They were settled in these countries already before 1417, and the plains of Hungary and the mountains of Transylvania may be regarded as the second important station in their European wanderings. They formed an important and not useless part of the population, devoting themselves to a limited number of nomadic occupations, notably the simpler kinds of smith work and music, and were neither maltreated nor despised by the people.

The first appearance of the gypsies in Germany is recorded in 1417. At about the same time other bands passed through the whole of Europe. They are recorded in Switzerland in 1418; in Denmark, 1420; in Italy, 1422; in France and Spain, 1447; in Poland and Russia, about 1500; in England shortly after. At first they were treated kindly and assisted in their poverty alike by people and government; but their thievish habits soon caused them to be driven from place to place, and stringent laws were frequently passed against them. This probably explains their sudden appearance in such distant parts of Europe at about the same period. The curious notion that they were of Egyptian origin was already widespread, and the gypsies themselves found it to their purpose to lend credence to it. They invented an imaginary "Little Egypt," and their chiefs, riding their well-kept horses, clad in many-colored garments and coin-bedecked, and followed by the miserable rabble of their tribe, posed as "counts" and "dukes" and "kings" of that land; or gave out that they were pilgrims on their way to Rome to do penance for apostasy, thus gaining the aid and good wishes of the simple. A large band wandered into Italy under the leadership of a "duke of Egypt" named Andrew, and encamped before the gates of Bologna on July 18, 1422. The "duke" himself entered the city and took lodgings at the "Albergo del Re," displaying a passport for himself and his tribe, signed by Sigismund, King of Hungary, and explaining to the town authorities that he and many others of "Little Egypt" had turned against Christianity and consequently had been driven from their country by King Sigismund. He himself and 4000 of his people had thereupon decided to renounce the error and return to the Church; and the King, after putting to death the most obstinate renegades, had imposed upon the others a penance of seven years' wandering and the obligation of going to Rome to get the papal absolution, as a condition of receiving back their lands and goods. For five years had they already wandered and now were approaching Rome. This story served the "duke" well for several years; but the imposition was ultimately discovered, and the whole band was expelled from Italy. In 1429 we find the city of Arnhem in Gelderland furnishing money and provisions "to the Count of Little Egypt, with his company," and another item "to the same Count and the heathen women, for the honor of God." In 1459 the town of Zutphen made a like present to the "King of Little Egypt," and Duke Egmont granted a passport to "Count Martin Gnougy, *geboren van Klijn-Egypten,* so that he might be helped on his pilgrimage." Many more instances might be cited; and it may be observed that in all these cases the gypsies were from Hungary, and strangers in the lands through which they were wandering. In the course of time their fraud was naturally exposed; and then the "dukes" and "counts," reduced to common vagabonds, either retraced their path to Hungary or remained with their tribes and became severally German and Italian and Dutch gypsies. As such they were treated as outcasts and often rigorously persecuted. In Germany acts of banishment were passed against them in 1479, 1500, 1544, 1548, and 1577, each more stringent than the last; and that of 1725, under Frederick William I, was the most cruel of all: "Gypsies, whether men or women, that are caught in the Prussian states, if over 18 years of age, shall be sent to the gallows without mercy, and may previously also be punished with branding and flogging, whether they have come into the country for the first time singly or in company, and whether they have passes to show or not." Christian III of Denmark gave the gypsies three months to leave the country in 1536, under penalty of death in case of return, and a similar royal edict was passed against them by Sweden in 1662. In France they were never allowed to gain a foothold. Hungary, Rumania, Poland, Russia, and England, on the contrary, have on the whole been generous to them, they have thriven in Spain, and Italy has tolerated the comparatively few that dwell there. To-day the tent-dwelling gypsies seldom pass from one country to another; they have become habituated to their adopted country, and with the growth of popular education and the increasing difficulty of leading the nomadic life, they are gradually losing their peculiar character and becoming assimilated to their neighbors. Their last migration is to the New World or to Australia; and here, in new surroundings, many thousands are already living, mostly English gypsies, but also bands from the Continent, especially from Hungary and the Balkan states. The gypsies are most numerous in Rumania and various parts of the Balkan region, Hungary (with Transylvania), and Russia. Their aggregate number in these countries is in the neighborhood of 500,000. On the migrations of the gypsies, consult especially Von Wlislocki, *Vom wandernden Ziegeunervolke* (Hamburg, 1890). That the gypsy question is yet a live one may be gleaned from the fact that in 1906 the ministry of Prussia issued edicts against them, and the following year an effort was made to expel them from the German Empire.

Language. It is a very prevalent impression among English-speaking people that the language of the gypsies is a simple jargon or cant. Nothing could be further from the truth. The broken dialect of the English gypsies, indeed, is a strange mixture of English and Romany, in which the grammar has almost wholly disappeared, and it is this fact that has created the popular impression. But in the farther East, where the race is more compact and has preserved far better its habits and instincts, Romany is a true and complete language, with a considerable vocabulary and a highly developed system of inflections. A brief characterization is all that is possible here; but the student is referred to the list of valuable works appended to this article.

There are fourteen distinct dialects of Romany in Europe: (1) the Greco-Turkish, (2) Rumanian, (3) Hungarian, (4) Slavonian, (5) Polish-Lithuanian, (6) Russian, (7) Finnish, (8) German, (9) Scandinavian, (10) Italian, (11) Basque, (12) Spanish, (13) Anglo-Scotch, (14) Welsh. Any one of these dialects is not easily intelligible to the speakers of the others. The purest are those of Turkey, the Balkan states, and Hungary-Transylvania; the most corrupt are those of England, Scotland, and Spain. We may first select the dialect of Turkey as an example of the pure Romany—the *lacho romano chib*—and then illustrate its corruption in the hybrid dialect, the *pŏsh* and *pŏsh romani*, of the English gypsies. For the Turkish dialect we owe our accurate knowledge to Dr. Alexander G. Paspati, of Constantinople, whose extensive researches are summed up in his *Etudes sur les Tchingianés, ou Bohémiens de l'Empire Ottoman* (Constantinople, 1870).

Alphabet.—As Romany is not a written language, it properly has no alphabet; but it is very rich in sounds, both vowel and consonantal.

Article.—(*a*) Definite masc. *o*, fem. *i*, from the Greek ὁ, ἡ. (*b*) Indefinite: *Yek*, properly "one." Examples: *o rakló*, the boy; *i rakli*, the girl; *yek chavó*, a child.

Noun.—There are two genders, masculine and feminine. Nouns may terminate equally in vowels and consonants. All nouns are fully declined, and there are eight cases, as follows:

	Masc.	Fem.
	rakló, boy	*raklí*, girl
	Singular	
Nom.	*rakló*	*raklí*
Gen.	*rakléskoro*	*rakliákoro*
First Dat.	*rakléste*, to the boy	*rakliáte*, to the girl
Second Dat.	*rakléske*, in the boy	*rakliáke*, in the girl
Acc.	*raklés*	*rakliá*
Voc.	*rakléya*	*raklié*
Instr.	*raklésa*	*rakliása*
Abl.	*rakléstar*	*rakliátar*
	Plural	
Nom.	*raklé*	*rakliá*
Gen.	*rakléngoro*	*rakliéngoro*
First Dat.	*raklénde*, to the boys	*rakliénde*, to the girls
Second Dat.	*raklénghe*, in the boys	*rakliénghe*, in the girls
Acc.	*raklén*	*raklién*
Voc.	*raklále*	*raklále*
Instr.	*rakléndja*	*rakliéndja*
Abl.	*rakléndar*	*rakliéndar*

Examples: *E roméskero raklé ta rakliá*, the boys and girls of the gypsy. *Terasa yek raklés*, we have a boy. *E raklia é penéla o raklo*, the boy says to the girl. *So sovén romále?* why do you sleep, O gypsies?

Adjective.—Masc. ends in *-ó*, fem. in *-í*. Exceptions are rare, as *shukár*, beautiful; *yavér*, other. All the oblique cases and the entire plural end in *-é*. Examples: *lachó chavó*, good child; *laché chavéskoro*, of the good child; etc.

Pronouns.—These are fully declined, like the nouns. The personal pronouns are *me*, I; *tu*, you (singular); *ov*, he; *oi*, she; as follows:

		Singular		
Nom.	*me*	*tu*	*ov*	*oi*
Gen.	*mángoro*	?[*tiro*]	*léskoro*	*lákoro*
First Dat.	*mánde*	*túte*	*léste*	*láte*
Second Dat.	*mánghe*	*túke*	*léske*	*láke*
Acc.	*man*	*tut*	*les*	*la*
Voc.	*me*	*tu*	. . . .	. . . .
Instr.	*mándja*	*túsa*	*lésa*	*lása*
Abl.	*mándar*	*tútar*	*lestar*	*látar*
		Plural		
Nom.	*amén*	*tumén*	*oe*	
Gen.	*améngoro*	*tuméngoro*	*léngoro*	
First Dat.	*aménde*	*tumende*	*lénde*	
Second Dat.	*aménghe*	*tumenghe*	*lénghe*	
Acc.	*amén*	*tumén*	*len*	
Voc.	*amén*	*tumén*	. . . . .	
Instr.	*améndja*	*tuméndja*	*léndja*	
Abl.	*améndar*	*tuméndar*	*léndar*	

Examples: *Me isóm*, I am; *pendé manghé*, they said to me; *tu penghiás aménghe*, you (sing.) said to us; *dikliás la lákoro dat*, her father saw her; *asálas lasa*, he laughed with her. The possessive pronouns are *mo*, my (fem. *mi;* oblique cases and plural *me*); *to*, your (sing.; fem. *ti;* oblique cases and plural *te*); *minró* (fem. *minrí*), my; *tinró* (fem. *tinrí*), your, yours (sing.); *léskoro* (fem. *lákoro*), his, hers; *amaró* (fem. *amarí*), ours; *tumaró* (fem. *tumarí*), yours (pl.); *léngoro* (masc. and fem.), their, theirs. The demonstrative pronouns are: *aká* or *avaká*, this (fem. *akiá* or *avakiá*, pl. *aklé* or *avaklé*). The interrogative is *kon*, masc., fully declined; and *so*, defective, neuter; and the relative is *ka*, indeclinable. Examples: *Mo chavó*, my boy; *mi raklí*, my girl; *me chavé*, my children; *to vast*, your (sing.) hand; *tinró sukaribé*, your (sing.) beauty; *léskoro grast*, his horse; *léskere dant*, his teeth; *lákoro pral*, her brother; *aká rakló*, this boy; *avaklé gavéste*, in this village; *kon kachél*, who will be left? *ta tu, so penés mánghe*, and you, what do you say to me?

Numerals (all Hindu, except "seven," "eight," "nine," from the Greek): *Yek*, one; *dúi*, two; *trin*, three; *shtor*, four; *panch*, five; *shov*, six; *cftá*, seven; *okhtó*, eight; *enéa*, nine; *dcsh*, ten; *dcsh-u-yek*, eleven, etc.; *bish*, twenty; *bish-u-yek*, twenty-one, etc.

Verbs.—The conjugation of verbs, regular and irregular, is exceedingly complex and full. As a general example, the regular verb *dáva*, to give, will suffice.

Present	
dáva, I give	*dása*, we give
désa, you give	*déna*, you give
déla, he gives	*déna*, they give

Imperfect		*First Aorist*	
dávas	*dásas*	*dinióm*	*diniám*
désas	*dénas*	*dinián*	*dinián*
délas	*dénas*	*diniás*	*diniás*

Second Aorist		*Future*	
diniómas	*diniámas*	*kamadáva*	*kamadása*
dineánas	*diniánas*	*kamadésa*	*kamadéna*
diniás	*diniás*	*kamadéla*	*kamadéna*

Imperative	
de, give!	*den*,' give! (pl.)

Subjunctive	
te dáva	*te dása*
te désa	*te déna*
te déna	*te dena*

Participle	
dinó, taken	(fem. *diní;* pl. *diné*)

Examples: *Kerava*, I make; *terélas but chavén*, he had many children; *so kamavéla*, what will come? *mc chinghióm les*, I killed him.

It will readily be seen from the above résumé that Romany, where well preserved, is a fully developed and highly inflectional language. This character it has kept where the gypsies live in large numbers, as in Hungary, for instance; but in every country it has received many influences from without. In Hungarian the word accent falls invariably on the first syllable, and this has influenced the Hungarian dialect. Thus, what would be pronounced *rakló*, boy, *raklí*, girl, in Turkey, would become *ráklo*, *rákli*, in Hungary and in all the gypsy dialects of the farther west.

A word about the corrupt English dialect. When the gypsies arrived in England, early in the sixteenth century, they spoke Romany of a pure and inflectional character. But association with the country people, and especially with the questionable gentry of the horse fairs and the roads, caused their speech to become more and more corrupt, until to-day it is the English grammar applied to several hundred gypsy words. The old gypsy men and women who spoke the "real language" (*tacho romani jib*) are dead, and their descendants have forgotten it; but fortunately scholars took it from their lips before it disappeared. Almost every inflected form of Romany may be found in the English dialect. Thus, of the verb, *keráva, kerésa, keréla, keréna, kérdo*, I, you, he, they make, made, are recorded; but the English gypsies of to-day, instead of *me keráva*, I make, say *mánde kers* (using the English vulgar termination *-s* in I makes), *tute kers, lesti kers*, etc. The migrations of the English gypsies are very discernible in their language. The basic stock is Indian; the Persian has supplied many words, as *devruál, dovyál*, sea, *vesh* or *wesh*, forest; the Armenian several, as *grast*, horse, *chor*, deep; not a few are from the Greek, as *drom* road, (δρόμος), *pet'l* horsehoe (πέταλον), *stadi*, hat (σκιάδι); the Slavic languages have furnished, among others, *krális*, king, *kichĕma*, inn, *lovínor*, beer; while German is represented by *stifi-pal* and *stifi-pen* (*Stief*bruder, *Stief*schwester), and French, as some think, by *bíti*, little (*petit*).

Representative specimens of several Romany dialects are here appended for comparison. Non-Romany words and forms are given in italics.

Turkish Dialect (Paspati, p. 600): Yek
A
dakár térclas trinén raklén, diniás e khurdés
king had three sons he gave to the youngest
hiliades [Greek] *ghrosha* [Turkish], diniás e
one hundred thousand piastres he gave to the
barés ta e maskaritnés. Ufkinótar o khurdó, liás
eldest and the middle [the same]. Up rose the youngest, took
o baró drom kárin t'arakélas choré délas lové,
the long road, every-where that he found poor people, he gave money,
akaring okoring diniás len khalias o lové.
here there he gave them, he scattered the money.

Hungarian Dialect (Von Wlislocki, p. 286):
Oh dädoro, báro ruk ándro bes, tu pélyäl, tu men
Oh dear father, great tree in the forest, you have fallen, you us
múklyäl! Ameu åvnäs túte cårä. Akänä nä hin
have left! We were your grasses. Now not is
ménge úshälyin. Ameu åvnäs tut' chíriklä!
to us shade. We were your birds!
Akänä nä hin rúkä! Kai úshälyin th' åräkäs, kai
Now no are trees! Where shade to find, where
rúkä th' äräkäs?
trees to find?

Bohemian Dialect (Ješina, p. 133): Kai jas,
Where go you,
mále? Jav ándro foros. So hi odoí túke te kérel?
friend? I go into town. What is there for you to do?
Mri rómni odoí géyas ókia the n'ável pále; na
My wife there went away and not comes back; not
jänav so pes låke tálindyas.
I know what to her has happened.

German Dialect (Liebich, p. 269): Ap o yek
Upon a
dívio grai klísyas givéses yek dsískero chávo. Goi
wild horse rode proud a spirited boy. Then
péndas o divio gúro graieske: "Laj! Tu múkyal
said the wild bull to the horse: "Shame! you allow
te ríkkervel tut yek chävéster?" "Ava," péndas
to hold you a boy?" "Yes," said
o grai, "har pátib véles mánge, yek cháves te
the horse, "How honor come to me, a boy to
chiverväva téle?"
throw down?"

English Dialect—old pure form (Smart and Crofton, p. 215): Dósta dosta béshạ ghiás konä́
Many, many years gone now
sas *a* [Eng.] bǻro krális adrā Anghiterra. Edwardus sas lésko nav, kúshto kómelo rai sas-lo.
was a great king in England. Edward was his name, good lovely gentleman was he.

English Dialect—modern corrupt form:
Where's yer jal'*in' to* ăch *yer* tăn? *We doesn't*
Where's yer goin' to pitch yer tent? We doesn't
jin. *We* pens *we'll* dik *some* kushto tăn *to* ăch
know. We thinks we'll see some nice place to camp
adoí aprā *the* drum adoí. Mándi pens *I* jin *a*
there in the road there. I thinks I know a
kúshto tăn *to* ăch akaí *under* dóva rúkya. *There's*
nice place to camp there under those trees. There's
shade adoí, *and* chor *for the* grais, *and* dústa
shade there, and grass for the horses, and plenty
pám, yúso *for the* chals *to* pē. Jal *with* mándi,
water, clean for the gypsies to drink. Go with me,
ta mándi'*ll* siker túte *the* kúshto tăn.
and I'll show you the nice place.

Religion and Folklore. Of the religion of the gypsies there is little to be said. On the one hand they are not idolaters, nor on the other have they any well-defined religious ideas. They may go by the name of Christians or Mohammedans, according to the religion of the people among whom they live, but at best they attach little vital significance to religious rites and worships. Their religious attitude was probably the same on their arrival in Europe; they brought with them their Indian religion, but so slightly grounded that it was easily obscured and then wholly lost. A curious proof of this is to be found in the Romany word *trúshul*. The *triśula* in Sanskrit is the three-pointed spear, or trident, borne by the Hindu god Shiva. From India the gypsies brought the word, along with a vague memory of the old god; but, arrived in Christian countries, they speedily forgot Shiva and transferred his symbol, the trident, to the symbol of the Christian religion, the cross; and all over Europe, in England as in Turkey, the *trúshul* is the cross of Christ.

It is stated in many books on the gypsies that they have no conception of God, and that there is no word for God in their language. This is wholly false. The name of God is to be found in every gypsy dialect and is of pure Hindu origin: *Devél* (Skt. *dēva*, god, Avesta *daeva*, an evil genius, Lat. *deus*). The English gypsy calls God *o bóro Dúvl*, the great God, or *mi-dúvl*, my God. The gypsy conception of God is partly pantheistic, but largely anthropomorphic. It varies, of course, with the grade of culture of the tribe. In England the gypsy is, to all intents and purposes, a Protestant Christian, with theological notions of a very vague sort and rather indifferent in the matter of devoutness; but often, in individual cases, he becomes an ardent evangelist and missionary. At the other extreme, geographically and racially, the gypsy of eastern Europe is almost a pagan, so rich is his mythology and folklore in supernatural beings, male and female, benign and pernicious, of every grade. It would be impossible in a limited space to give an adequate idea of the complete mythological system, e.g., of the Transylvanian gypsies as recorded by Wlislocki. They have developed a thorough cosmogony; and the sky and woods and streams are peopled in their imagination with numberless beings, whose influence must be sought and whose vengeance must be averted with amulets and charmed words. Not an illness, not an animal in nature that does not have its "spirit"; and every "omen," every coincidence, every dream, has its portentous meaning.

Peculiar Customs, etc. The gypsy, wherever he lives, inclines naturally to some occupations rather than others, and especially to those that admit of a roving life, or at least of a life in the open air. He is universally a mender of pots and pans, and in the East, where the gypsies are settled in communities, they engage in many employments, such as smithing, basket making, and the like. Horse trading is a favorite means of livelihood and almost the only one in England and America. The women "tell fortunes" and gained no small profits by their skill in more credulous days, while even now they earn a good living in this way from the frivolous. In Hungary especially, also in Rumania, Russia, and Poland, the gypsies are noted as musicians, and Liszt himself has borne tribute to their genius. (See his work on Gypsy music, cited below.) This music is wild and wonderfully effective, being wholly by ear and most accurate in technique. In their relations with *gāje* (gajos) or nongypsies, they are genial, friendly, ready to do business; but in matters pertaining to themselves, their life and language, often inclined to be reticent. When, however, they have confidence in a nongypsy friend, their sincerity and fidelity know no bounds. Much has been written about the gypsies in a spirit of hostile prejudice or commiseration; it must be admitted, none the less, that those who have gained their confidence and learned their ways and their point of view have always spoken well of the Romany.

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GYP'SUM (Lat., from Gk. γύψος, *gypsos*, chalk, probably of Semitic origin; cf. Ar. *jibs*, gypsum, from *jabasa*, to walk haughtily). A hydrated calcium sulphate, composed of lime 32.56 per cent, sulphuric acid 46.51 per cent, and water 20.93 per cent. It crystallizes in the monoclinic system, has a hardness of 1.5 to 2, and a specific gravity of 2.32. The crystals are found in beds of massive gypsum, in veins by themselves or with ore, or scattered through beds of marl and clay. When transparent, they are called selenite. Alabaster (q.v.) is a massive white, opaque variety of gypsum, and satin spar is a fibrous variety. A loose, earthy gypsum found in Kansas passes under the name of gypsite, or gypsum dirt. Gypsum sand is a sand composed almost entirely of gypsum grains. The color of gypsum may be white, red, green, blue, gray, or brown. When pure gypsum is heated to a temperature of between 250° F. and 400° F., it loses about three-fourths of its water of combination, the calcined product being plaster of Paris, which, when mixed with water, takes up in chemical combination as much as it has lost and sets to a hard mass. The presence of impurities retards the setting, and such slow-setting plasters are termed *cement plasters.* They are of value for structural work. Gypsum calcined above 400° F. is dead-burned and appears to lack setting properties. If heated to about 900° F. and finely ground, it sets slowly to a hard product called *flooring plaster.*

The impurities which gypsum may contain, sometimes in quantity, are clay, lime carbonate, sand, and anhydrite. The last may be very irregular in its mode of occurrence, forming beds, lenses, or veins in the rock gypsum. It is of no commercial value and in districts where abundant is an annoyance.

Occurrence. The three main types of occurrence are (1) rock gypsum, which is the most important commercially; (2) gypsite, forming shallow surface deposits, in the western United States; and (3) gypsum sands, found in Arizona and New Mexico. Other types of little or no commercial importance are periodic lake deposits, disseminated lumps in clays and shales, veins, and fumarolic deposits around volcanic vents.

Origin and Distribution. The origin of gypsum is usually ascribed to the evaporation of sea water, although to yield a deposit several hundred feet thick would require the evaporation of an ocean of enormous depth. (For further discussion of this, see SALT.) Most deposits of gypsum found in the world are considered to have been derived in this manner, although the gypsum is not deposited until about 80 per cent of the salt water has been evaporated. Gypsite deposits are probably formed by underground waters leaching gypsum from the hills, carrying it in solution to the lowland soils, and there depositing it, when the water evaporates. Some beds of the material have been formed by the action of sulphuric acid liberated by the decomposition of pyrite, acting on carbonate of lime, converting it into calcium sulphate. In such cases there may be a gradual passage from the limestone into the gypsum rock. Gypsum is widely distributed geologically, being found in various formations, ranging from the Silurian up to the Tertiary. Extensive beds of gypsum are found in the Silurian formation in New York, the Carboniferous of Ohio and Michigan, the sub-Carboniferous of Virginia, and the Cretaceous of Iowa and Kansas. Deposits also occur in Arizona, California, Colorado, Wyoming, Oklahoma, Texas, and Utah. It is also found in Canada, Germany, Norway, France, Austria, Bohemia, Italy, Egypt, Arabia, and Persia. That found in New Brunswick and Nova Scotia is often of high purity. It is mined sometimes by quarry methods and sometimes by underground workings.

Uses. The use of gypsum seems to have been known at a very early period, for the Greeks were familiar with it, as shown by the writings of Theophrastus and Pliny. The commercial value of gypsum depends largely on the color and freedom from grit, the whiter grades being calcined and used for plaster. This calcining is commonly done in large kettles, the material having been previously ground in crushers and mills. The kettles are usually about 6 feet deep and 8 feet in diameter, and are filled to a depth of 5 feet. They are heated from below, and the gypsum is constantly stirred during the calcining process by revolving arms. Aside from its uses for ordinary plastering, it is also extensively employed in the manufacture of ornamental stucco work, as a filler in paper, in making imitations of marble, and sometimes for calcimining. Where a slow set is desired a retarder is sometimes used, such as glue, hair, lime, etc. Much gypsum is used as a retarder for Portland cement and as a bed for polishing plate glass. Raw gypsum is also used as a basis for paints, the pigments being mixed with it. *Keene's cement* is made by calcining gypsum at a red heat, immersing it in an alum bath, drying and calcining again. *Mack's cement* is a dehydrated gypsum mixed with a 0.4 per cent of sodium or potassium sulphate. It is used for flooring, walls, or ceilings. The impure crude gypsum finds application only for fertilizing purposes and is extensively employed in both England and America for increasing the fertility of soils. (See MANURES AND MANURING.) It is also employed at times to counteract the black alkali which forms in many of the soils of the arid region. Alabaster has been used for many years for decorative purposes and in the making of statuary, while satin spar has been employed for necklaces, inlaid work, and other ornaments.

The marketed production of gypsum in the United States in 1912 was: crude gypsum, 441,608 short tons, valued at $623,522; calcined gypsum, 1,731,674 short tons, valued at $5,940,386. In the United States, New York is the largest producer, with Iowa second. The imports in 1912 were valued at $488,481. Among the world's producers France leads, with the United States second and Canada third, in amount of production.

Bibliography. Grimsley and Bailey, *Gypsum Deposits of Kansas*, issued by Kansas Geological Survey (Topeka, 1899); La Croix, "Le gypse de Paris et les mineraux qui l'accompagnent," in *Nouvelles archives des museum histoire naturelle* (Paris, 1897); Grimsley, *Michigan Geological Survey*, vol. ix, part ii (Lansing, 1904); Eckel, *Cements, Limes, and Plasters* (New York, 1907); W. F. Jennison, *Report on the Gypsum Deposits of the Maritime Provinces* (Ottawa, 1911). For statistics, consult volumes of the *Mineral Resources*, issued by the United States Geological Survey (Washington, annual). See PLASTER OF PARIS.

GYP'SY MOTH. This insect is abundant throughout the temperate zone in the Old World and often does much damage to fruit, shade, and forest trees, particularly in France, Germany, and southern Russia. It was first described by Linnæus in 1758 and named by him *Bombyx dispar*, but later authorities place it in the genus *Porthetria.* The eggs of the moth are laid in August in a yellow, hairy mass on tree trunks, rocks, and fences. They hatch the following spring, and the caterpillars feed on all kinds of trees, shrubs, and plants. Even conifers are not exempt from their ravages, and the latter trees usually die after one defoliation. By the middle of July the caterpillars become full grown, when they pupate in loose cocoons in sheltered places, and the moths emerge in about two weeks' time. The male moth is brown and flies actively, while the large white female does not fly.

This insect was introduced into Medford, Mass., by Leopold Trouvelot, who in 1869 was experimenting with various American and European silkworms in the effort to find some hybrid which might be exempt from the attacks of the pébrine disease of silkworms. Trouvelot's specimens escaped accidentally, and although he notified the proper authorities, the matter was lost sight of until about 1889, when the ravages of the caterpillars at Medford were sufficient to cause general alarm. A year or two of desultory efforts on the part of property owners in this vicinity were sufficient to convince them that they could not successfully cope with the insect, and the aid of the State was asked. In 1890 the Legislature of Massachusetts began the effort to exterminate the moth, first placing the work in the hands of a commission and later transferring it to the State Board of Agriculture. This work was carried on systematically for about 10 years, at an aggregate expense to the State of nearly $1,000,000, when it was permitted to lapse, chiefly because public sentiment in Massachusetts would not support it further. The insect having become scarce, it was difficult to convince taxpayers of the necessity of further appropriations to secure the last remaining ones. Since the abandonment of the work by the Legislature in 1900, the moth has gradually increased to a point where several municipalities have been obliged to take up the work of destroying it, using the methods originated and perfected by the Board of Agriculture. Unless thorough work can be prosecuted over the entire district, it is quite probable that in a few years damage by the moth will become much more severe than ever before. Consult: Forbush and Fernald, "The Gypsy Moth," *Massachusetts State Board of Agriculture* (Boston, 1896); Howard, "The Gypsy Moth in America," *Bulletin 11, United States Department of Agriculture* (Washington, 1898); all annual reports of the State Entomologists of our Northeastern States; bulletins published by the Massachusetts State authorities, by the United States Bureau of Entomology, and especially scattered articles in the *Journal of Economic Entomology* from 1908 to the present date. See Insect, *Economic Importance of.*

GYPSY MUSIC. See Magyar Music.

GYRATION, Centre of. See Centre of Gyration.

GYRATORY BREAKER. See Grinding, Crushing, and Pulverizing Machinery.

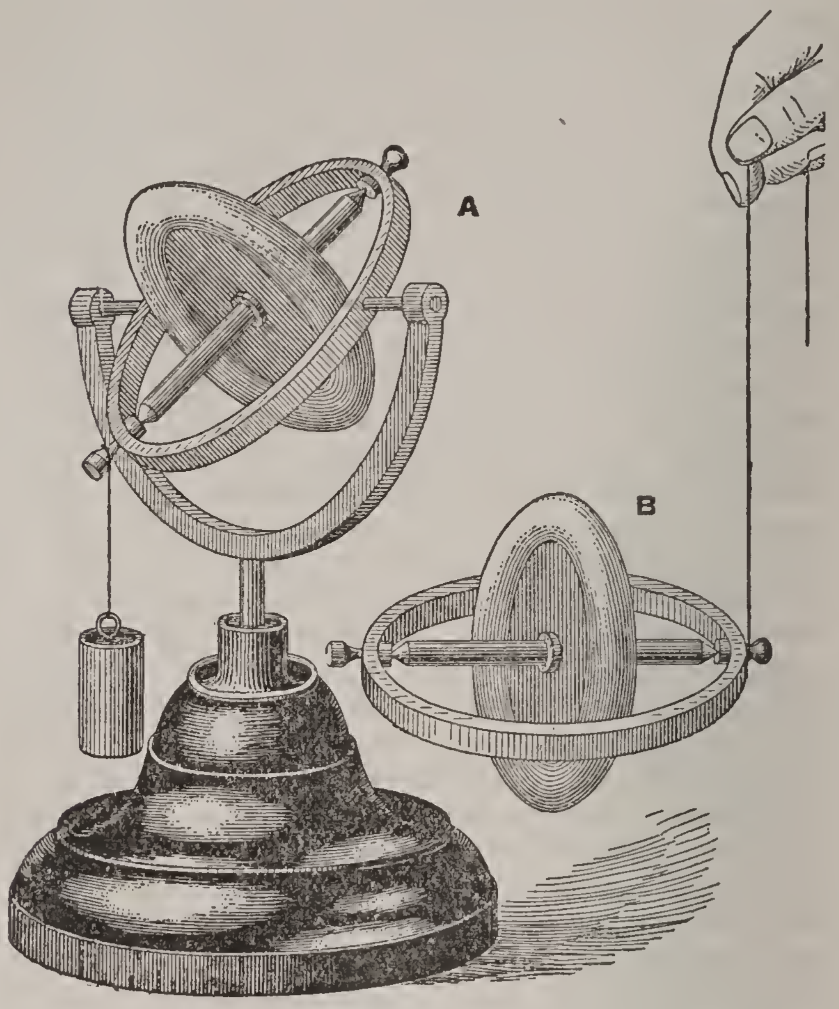
GYRFALCON, jẽr′fa̤′k'n (OF. *gerfaucon, girfaucun, gerfault,* Sp. *gerifalte, gerifalco,* from ML. *hierofalco,* gyrfalcon, from Gk. ἱερός, *hieros,* sacred; popularly connected with ἱέραξ, *hierax,* falcon, although the words are only remotely akin, + Lat. *falco,* falcon, confounded in popular etymology with Lat. *gyrus,* circle, in fancied allusion to the bird's circling flight). A large falcon (*Falco islandus*), the female of which is about 2 feet in entire length. The plumage is almost brown when the bird is young, but gradually changes to white as it advances in age, the white margin of each feather encroaching on its brown centre, until aged birds are almost pure white. It is rarely seen in the United States or other temperate regions, except in severe winters, but inhabits all the very cold northern parts of the world. It was formerly in high esteem for falconry and was procured at great expense from Iceland and Norway. Two species (*Falco islandus* and *Falco rusticolus*) and two subspecies are recognized in America. See Plate of Falcons and Falconry.

GYRO-COMPASS. See Compass.

GY′ROMAN′CY. See Superstition.

GYRON′NY. See Heraldry.

GY′ROSCOPE (from Gk. γῦρος, *gyros,* circle + σκοπεῖν, *skopein,* to view). The name given by Foucault to an instrument for the exhibition of various phenomena of rotation, of a freely suspended body and the composition of such rotations first described by Bohnenberger in 1817. It differs from a top in having both ends of its axis of rotation supported. The invention is probably French or German, and in some of its forms it dates from about the end of the eighteenth century, but no certain information can be obtained as to the original inventor. Its action is based on the principle that if a mass is set in rotation about its principal axis of inertia of greatest or least moment, it will continue to revolve about it, and unless extraneous force is applied the direction of the axis will remain unchanged. If, then, a mass of metal—as, e.g., a circular disk, loaded at the rim and revolving in its own plane—be made to rotate rapidly about its axis of greatest moment of inertia, and if it be freely supported (in gimbals, like the box of a compass), the direction of its axis will be the same so long as the rotation lasts. It will therefore constantly point to the same star and may be employed to show that the apparent rotation of the stars about the earth is due to a real rotation of the earth itself in the opposite direction. This application was described by Foucault in 1852, who set his gyroscope in rotation, and then with a microscope observed the apparent change in the plane of its rotation caused by the movement of the earth.



GYROSCOPE.

The most interesting phenomena shown by the gyroscope are those depending on the composition of rotations. Any motion of a body which has one point fixed is of the nature of a rotation about an axis passing through that point. Hence simultaneous rotations about any two or more axes, being a motion of some kind, are equivalent to a rotation about a single axis. The effect, then, of impressing upon the frame in which the axis of the gyroscope is suspended a tendency to rotate about some axis, is to give the whole instrument a rotation about an intermediate axis; and this will coincide more nearly with that of the gyroscope itself, the greater the rate of its rotation. It is not possible to explain to the nonmathematical reader the exact nature of the compound motion, but the rotation of the axis of a top round the vertical (when it is not "sleeping" in an upright position), and the precession of the earth's axis, are precisely similar phenomena. Thus, when the gyroscope is spinning, its axis being horizontal, a weight attached to the framework at one end of the axis (Fig. A) makes the whole rotate about the vertical, in fact, taking up a movement normal to the impressed force, this being known as precession. Often the apparatus is so arranged that the framework may be lifted by a string attached near one end of the axis (Fig. B), as in the familiar toy, and the gyroscope will then revolve without falling. Its axis still projects horizontally from the string, but it revolves as a whole round the string.

When a top is suspended, as in Fig. B, it is obviously under the action of a torque due to the weight of the top; this torque has as its axis a horizontal line perpendicular to the axis of the top. If I is the movement of inertia of the top about its axis of spin, h its angular velocity of spin, and K the value of the torque, then the whole top will be maintained in its precessional motion about a vertical axis with an angular velocity H, where $K = IhH$. Thus, if the top is spinning slowly, its precession is rapid. The general statement, then, is that in order to turn the axle of a spinning wheel about a perpendicular axis, it is necessary to apply a torque K about a third axis, perpendicular to the other two, whose value is $K = IhH$; this may be called the "gyroscopic resistance."

If the top in Fig. B is set spinning but not at first allowed to precess, and is then set free, its axis will at first incline downward, and then precession will begin; the top will rise and fall during this motion, making a series of oscillations.

In the general case of a symmetrical top spinning on its axis, but having one point fixed, as in Fig. B, the main effect of a torque about any axis may be deduced at once by the ordinary laws of composition of vectors; thus, if one attempts to hurry on the precession by pushing the framework sidewise, this is a torque about a vertical axis, and being compounded with the existing rotation around a horizontal axis causes this axis to tilt upward. In many applications of gyroscopes this applied torque is due to friction.

If by any means the direction of the axis of a spinning body is changed, there will be a *reaction* in the way of a torque upon the supporting framework. This may be used in many ways, as is shown in the description of various practical instruments, which follows.

The spinning top of Fig. B is free to have its axis in any direction; but by suitable clamps this freedom may be restricted. The reaction upon these clamps when the top is moved may be studied by means of the principles given above.

But the gyroscope must be considered as more than a piece of scientific apparatus to interest the physicist and the mathematician, or as an amusing toy that seems to defy the laws of nature. It has found important applications in stabilizing rolling ships at sea, in directing automobile torpedoes, in the useful gyro compass, in various monorail schemes for transportation, and in the autostabilizer for aëroplanes. Perhaps the first of these applications was the Obry gear for torpedoes, the invention of an Austrian naval officer, but modified more or less as used in various other services. This is discussed under TORPEDO. Then there was the application of the gyroscope principle to the compass by Martienssen and Anschütz-Kaempfe in Germany and by Elmer A. Sperry in the United States. As a result, there has been developed a compass that is independent of magnetism and which has proved remarkably successful, as will be found discussed under COMPASS. Likewise the various schemes to use the gyroscope to support a high-speed car on a single track have met with some experimental if not practical success, as will be discussed under MONORAIL; but perhaps the most interesting fields of usefulness have been the autostabilizing devices for ships and aircraft, in both of which departments an American engineer and inventor, Elmer A. Sperry, has achieved marked success; while Dr. Schlick, of Germany, has also accomplished much by the use of a so-called passive type of gyro, where the machine was suspended in a ship with freedom of movement about its axis of rotation, which was vertical, and about its axis of precession, which was athwartship. The Sperry gyro received a full test on the U. S. S. *Worden*, a destroyer of the United States navy, and the S. S. *Ashtabula*. On the *Worden* the gyros were mounted with their axes horizontal and normally athwartship, having the precession rings pivoted about the vertical axis, movement about the latter being controlled by a so-called "precession engine," which in turn was controlled by a small gyroscopic pendulum. Thus any tendency to roll caused the precession engine to move the gyros so as to deliver an impulse to the ship about its longitudinal axis that would counteract this tendency. The spinning wheel was driven by an induction motor with friction drive, requiring along with the apparatus for controlling precession but a limited amount of power. The gyro was able to reduce extraordinarily the amount of rolling and thus presented many advantages, especially for warships. On the other hand, for an ice-breaking steamship with the gyro apparatus it was possible to produce artificial rolling.

For the Sperry aëroplane stabilizer a gyro spun by three-phase alternating current from a generator on the shaft of the engine works a pilot valve which operates the horizontal rudders against a tendency to tip about the horizontal axis, while another feature of the longitudinal stabilizer operates to volplane the machine in case the speed falls below the critical point. The lateral stabilizer also employs a gyro which through a pilot valve controls the ailerons to counteract against lateral tipping. This gyroscopic machinery has been constructed of such small weight relatively that its use does not interfere with the operation of an aëroplane or hydroplane. Gyroscopic apparatus also has been fitted to roll and pitch recorders on board vessels and to an artificial horizon for use in astronomical observations, especially with the sextant at sea.

The gyroscope is thoroughly discussed in H. Crabtree's little book *Spinning Tops and Gyroscopic Motion* (2d ed., London, 1914). For its "engineering applications" consult Sperry in *Journal of Franklin Institute* (Philadelphia, 1913). See COMPASS; MONORAIL; TORPEDO.

GY'ROSCOP'IC PENDULUM. See MECHANICS.

GYROS'TEUS. See CHONDROSTEUS: STURGEON.

GYROWETZ, gē'rō-vĕts, ADALBERT (1763–1850). An Austrian composer. He was born at Budweis, Bohemia, and, after studying law at Prague, devoted himself entirely to music. Introduced to the Vienna public through the influence of Mozart, his first symphonies were received with marked favor, and he was soon enabled to continue his studies at Naples, Milan, and Paris. He afterward became a favorite of the Prince of Wales at London and upon his return to Vienna was appointed conductor of the

Imperial orchestra. In that capacity he directed the opera from 1804 to 1831. He was a very prolific composer, writing over 60 symphonies, 40 ballets, and 30 operas, the most popular of the latter being *Agnes Sorel* (1811) and *Der Augenarzt* (1811). His autobiography was published in 1848.

GYTHIUM, jĭth′ĭ-ŭm (Lat., from Gk. *Γύθιον*). A town in the Peloponnesus, at the mouth of the river Gythius, on the Laconian Gulf, near the modern Marathonisi. It lay opposite the island of Cranaë, and was the port of Sparta, 27 miles distant. The harbor was an artificial one and was protected by a breakwater. Its inhabitants claimed Apollo and Heracles as its founders, but it seems to have been originally a settlement of Phœnicians, attracted by the presence of the murex, which yielded the Phœnician red dye. It was the ordinary station of the Spartan fleet, and in the wars against Athens it was therefore exposed to frequent attacks. Tolmides, the Athenian commander, burned it (455 B.C.). Later it was besieged unsuccessfully by Epaminondas (370 B.C.). It was strongly fortified by the tyrant Nabis; but he was compelled by Flamininus to give up Gythium and other coast towns to the Achæan League (195 B.C.). In 192, however, it was recovered by Philopœmen; it remained part of the Achæan League (see Achæans) till that league was dissolved in 146 B.C. It afterward became a member of the league of independent Laconian towns, which after the time of Augustus received the name of the Free Laconians. Excavations in 1891 uncovered part of the theatre and of other ancient structures, and there are numerous ruins of Roman times in the neighborhood. A considerable part of the ancient city seems to be covered by the sea, as extensive ruins can be seen in the bay on a calm day. The site is described by Leake, Le Bas, Ross, Curtius, Philippson, and others in their books on the Peloponnesus, and a good plan is given in Le Bas, *Voyage archéologique, Itinéraire* (Paris, 1888). The excavations are described in the *Πρακτικά* of the Greek Archæological Society (Athens, 1891). The modern town is a busy place, the chief exporting harbor for the plain of Sparta. Pop., 1909, about 4000.

GYULA, dyo͞o′lŏ, or **BÉKÉS-GYULA**, bā′kāsh dyo͞o′lŏ. Capital of the county of Békés, Hungary, situated on the White Körös, in a somewhat swampy district, 45 miles southwest of Grosswardein (Map: Hungary, G 3). Formerly a fortress, it has a museum of antiquities, and manufactures of flour, wine, oil, and spirits; turtle fishing; and a considerable trade in cattle. It is lighted by electricity. Pop., 1900, 22,446; 1910, 24,284.

GYULAI, dyo͞o′lŏĭ, Franz, Count von Maros-Németh and Nadaska (1798–1868). An Austrian soldier, born at Pest. In 1814 he entered the Austrian army and by 1846 had risen to the rank of major general commanding a division. In that year also he was appointed commandant of Triest, in which post in 1848 he assembled the scattered vessels of the Austrian navy, so far as possible, under his control, and after the outbreak of revolution assumed command of this naval force upon his own responsibility and maintained a coast defense. He became War Minister in 1849. The most conservative member of the cabinet, he tried to overcome the effects of 1848. In 1859 he received chief command of the Austrian army in the Italian War, but after his defeat by the Franco-Sardinians at Magenta he retired from the service. Consult Rüstow, *Der italienische Krieg 1859, politisch-militarisch geschrieben* (Zurich, 1859).

GYULAI, Pál (1826–1909). An Hungarian poet and literary critic. He was born and educated at Klausenburg and was appointed professor of Hungarian literature at Budapest in 1875. He was also president of the Kisfaludy Society (1881–99) and editor of the review *Budapesti Szemle.* His works include a biography of Vörösmarty (2d ed., 1879), a critical work on Katona (2d ed., 1883); the collection of novels entitled *Vázlatok és képek* (Sketches and Pictures, 2 vols., 1867); and a volume of poems (1882; new ed., 1895), which, though of a popular tone, reveal a lofty elevation of thought and an impeccable art.

GZOWSKI, gzhŏv′ski, Sir Casimir Stanislaus (1813–98). A Polish-Canadian engineer, born in St. Petersburg, Russia. He graduated at the military engineering college in Kremnitz, Volhynia, and had a commission in the regular army that he relinquished to join the patriots of Poland in their insurrection, for which he was imprisoned in Austria and banished, going to the United States in 1833. Having no knowledge of English, he could not follow his own profession there, so he taught French, German, drawing, and fencing; studied law in Pittsfield, Mass., and practiced it in Pennsylvania. In 1841 he went to Toronto, where he obtained a position in the Department of Public Works. In 1842–48 he was superintending engineer of roads and harbors in western Ontario. He had charge of the harbor works at Montreal (1850–53), was chief engineer of the St. Lawrence and Atlantic Railway Company, and in 1857–69 was a partner in a railroad-building firm which owned rolling mills in Toronto. In 1871 he was engineer of the International Bridge across the Niagara River. In the same year he made a report on the enlargement of the Welland Canal and the Baie Verte Canal scheme. Gzowski took a prominent part in Canadian military matters, and for some years was president of the Dominion Rifle Association. He became colonel in 1879, was the first president of the Society of Canadian Civil Engineers, and in 1890 was created a K.C.M.G.

H

H The eighth letter and sixth consonant in the English alphabet. Its form is derived, through the intermediate Latin H, from the Chalcidian Greek H, and the Phœnician 𐤇. As this character was used in Greece for both an aspirate and a vowel sound, some differentiation of form was found to be necessary, and accordingly Ͱ was used for *h* and H for *ē*. The form Ͱ passed through the stage L to the symbol ʽ, for the rough breathing. In like manner ʼ came to stand for the smooth breathing. The Latin H and the Greek *ēta* (H) are identical in both form and alphabetic position, but they have not the same value. They have taken the position of *cheth*, the eighth letter in the north Semitic alphabet. This letter has been supposed by some scholars, both from its form and the meaning of a similar root in Syriac, to denote an inclosure, a barrier; but it is generally admitted to-day that no word exactly like it is found in any Semitic language. It may have been the non-Semitic name of the object represented by it, used by the people, possibly of Cretan origin, whence the alphabetic signs came to Syria. See ALPHABET.

Phonetic Character. The modern sound of *h* is a gradual weakening of an old strong guttural or back-palatal, as in Ger. *lachen*, Scot. *loch*. In OEng. *h* was a guttural; later on, it softened to a spirant, or often practically disappeared. Linguistically the Eng. *h* comes from: (1) Indo-Ger. *k* > Ger. *h*, as *hurdle*, OHG. *hurt*, Goth. *haúrds*, Lat. *crates*, Gk. *κάρταλος*, Indo-Ger. *kert*, to bend, to weave; (2) Ger. *hv*, as *who*, Goth. *hvas*, Lat. *quis*, Indo-Ger. $q^{\underset{\frown}{u}}o$; (3) the combination *gh* in English orthography is usually a way of writing the OEng. spirant, thus, *high*, OEng. *hēah*, Ger. *hoch*. This *gh* sometimes shows labialization, as the sound of *f* as in *trough, slough;* or sometimes it is so attenuated through palatalization as practically to disappear, e.g., *mighty*. In *ch, th, ph, sh*, the *h* indicates a spirant pronunciation. The pronunciation of the *h* is one of the most difficult things in the English language. It depends partly on the following vowel and partly on accentuation. In French the sound is disappearing, but it is being more used in England and America.

As a Symbol. H in chemistry = hydrogen. As a numeral, H = 200, H̄ = 200,000. In Greek ή was used for 8; ͵η for 8000.

HAAG, häg, J. CARL (1820–1915). A German painter in water color, long a resident of England. He was born at Erlangen, studied principally with Reindel in Nuremberg and at Munich and later with Cornelius at Rome. From the time of his removal to England in 1847, he devoted himself to water color. In 1850 he was elected member of the Royal Society of Painters in Water Color. He traveled much in the Balkans, Greece, and in the Orient, especially among the Bedouins, whose life he has portrayed with truthful vigor and brilliant color effects. He received special permission from the Sultan to paint the holy places of Jerusalem and was painter to Queen Victoria on her yearly travels in Scotland. After his return, after 55 years of absence, to Germany, he lived in the famous Red Tower at Oberwesel on the Rhine, which he bought and restored.

HAAKON, hạ'kôn, improperly HAKON. The name of several Norwegian kings. The earliest of them, HAAKON THE GOOD, was sent to the court of Athelstane in England, from which he returned with a fleet when the Norwegian throne was seized by his brother Eric, after the death of their father, Harald Haarfager (933). He defeated Eric and ruled from about 934 to 961. He was a Christian, and English missionaries under his protection did much to Christianize Norway.—HAAKON MAGNUSSON, a grandson of Harald Haardraade, was King for a short time, in association with his cousin, about 1093–95.—HAAKON HERDEBRED (1147–62), son of Sigurd, ruled for only five years (1157–62), a stormy period, full of revolt and strife.—HAAKON HAAKONSSON (1204–63), "the Old," grandson of Sverre and son of the Haakon who ruled from 1202 to 1204, is best known for the addition of Greenland and Iceland to the Norwegian realm during his reign.—HAAKON MAGNUSSON, the elder, succeeded his brother, Eric, on the throne in 1299 and reigned to 1319. He was the last descendant of Harold Haarfager in the male line.—Another HAAKON MAGNUSSON, called "the Younger," was son of Magnus Eriksson, King of Sweden and Norway, who was forced to resign the crown to Haakon in 1343, when the latter was still a child, remaining Regent during his minority. Haakon reigned in Norway till his death, in 1380; he was also King of Sweden in 1362–63; he married the Danish Princess Margaret, and thus prepared the way for the union of the three Scandinavian kingdoms. Consult G. Sturlason, *Stories of the Kings of Norway* (trans. from Icelandic, London, 1906). See HAAKON VII, below.

HAAKON VII (1872–). King of Norway after 1905. He was born Aug. 3, 1872, as the second son of Frederick VIII of Denmark, then Crown Prince, and was baptized Charles. In 1896 he married Princess Maud, youngest daughter of Edward VII. On Oct. 31, 1905, when the separation of Norway from Sweden had become a fact, the Norwegian Storthing empowered the government to enter into negotiations with Prince Charles relative to his acceptance of the Norwegian crown. On November 12 the people approved the offer of the crown to the Danish Prince by 259,563 votes to 69,264. On November 18 Prince Charles was elected King by the Storthing. He assumed the title of Haakon VII and gave to his son (born in 1903) the name of Olaf. He took the oath before the Storthing on November 27 and was crowned in the historic cathedral at Trondhjem, June 22, 1906.

HAA'NEL, Eugene (1841–). A Canadian physicist and mineralogist. Born at Breslau, Germany, and educated there at the Gymnasium and University, he went to the United States in 1856 and served in the Federal army during the Civil War. He held the chair of modern languages in Adrian College (1864) and in Hillsdale College (1865); and was professor of natural science in Albion College, Michigan (1868–72); of physics and mineralogy in Victoria University, Cobourg, Canada (1872–89)—while there he built and equipped Faraday Hall for practical science; and of physics in Syracuse University until 1901. He then became superintendent, and in 1908 director, of mines for Canada. In 1901 he was appointed chairman of a commission to investigate electrothermic processes in iron-ore smelting and steel making in Europe. In 1909 he was elected vice president of the American Institute of Chemical Engineers, in 1909–10 he was president of the American Peat Society, and he was made a charter fellow of the Royal Society of Canada. In 1912 he was appointed a special lecturer on economic geology in McGill University. His publications include *Report on Experiments made at Sault Ste. Marie in the Smelting of Canadian Iron Ores by Electro-Thermic Processes* (1907), and *Experience in the Use of Peat Fuel from the Government Plant at Alfred, Ont.* (1911).

HAAR, här, Bernard ter (1806–80). A Dutch poet, born in Amsterdam. He obtained his degree in theology, held several pastorates, and in 1854 was made professor of Church history in the University of Utrecht, retiring in 1874. He wrote a number of theological articles and *Wie was Jezus?* (1863). His other prose works include *De Historiographie der Kerkgeschiedenis* (2 vols., 1870–73). Some noteworthy poems are: *Johannis en Theagenes* (1838); *Huibert en Klaartje* (1844; 3d ed., 1858); *De Sankt Paulus Rots* (5th ed., 1865); and those in collections published in 1871, 1878, and 1879.

HAARLEM, här'lĕm. The capital of the Dutch Province of North Holland, situated on the Spaarne, 11 miles west of Amsterdam (Map: Netherlands, C 2). It is an extremely clean and well-built city, situated amid very picturesque environs intersected by canals and full of interesting houses. The principal church is the Groote, or St. Bavo's Kerk, a fifteenth-century cruciform edifice, with a tower 262 feet high and an organ built in 1735, with 5000 pipes, 64 stops, and 3 keyboards—one of the largest instruments of its kind in the world. In front of the church is a statue of Coster, the alleged inventor of printing. In the Groote Markt is the meat market, a brick and stone building dating from the beginning of the seventeenth century and considered to be of great architectural merit. The town hall, a former palace of the counts of Holland, remodeled in 1620, contains a small collection of paintings by Dutch artists, including eight large canvases by Frans Hals. In the same building are also the town library and a collection of weapons, glasses, and instruments of torture associated with the early history of Haarlem. Among other interesting buildings may be mentioned the Pavilion, a château in Italian style, now the seat of the Society for the Promotion of Industry, and containing an industrial art and a colonial museum. The educational institutions of Haarlem include a Gymnasium; a seminary for teachers; the Teyler Museum with its numerous scientific collections and an extensive library; the episcopal museum with a collection of Dutch ecclesiastical antiquities. There are also two theatres and the oldest printing house in Holland. The town contains numerous homes for the aged, known as *hozjes.* Haarlem has a number of industrial establishments, notably textile mills. One of the oldest and most extensive industries is the cultivation of flowers, Haarlem exporting bulbs to many European countries. There are electric and horse tram lines for local purposes and an electric railway for interurban traffic. Pop., 1911, 70,491.

Haarlem grew up around a castle, and obtained municipal rights in 1245. In 1492 it was seized by the peasantry, and upon its being recovered by the Imperial Stadholder, Duke Albert of Saxony, it was deprived of its privileges and burdened with heavy taxes. In 1559 it became the seat of a bishop. Haarlem took a prominent part in the revolt of the Netherlands and was besieged in 1572 by an army of 30,000 men under Don Federico, a son of the Duke of Alva, and after an heroic resistance capitulated to the Spaniards, who, regardless of their promise of mercy, avenged themselves on the city and its inhabitants in the most cruel way. In 1577 it was freed from the rule of Spain by the Prince of Orange and became a part of the Netherlands.

HAARLEM LAKE. A district in the Dutch provinces of North and South Holland, formerly a lake. It lies between Haarlem, Amsterdam, and Leyden (Map: Netherlands, C 2). It was formed from four small ponds by an inundation of the sea at the end of the sixteenth century. At one time its area was 60,000 acres. In consequence of the destructive overflow of 1836 the government decided to drain the lake. The work was begun in 1840 and completed in 1853. The land reclaimed forms at present an island of 70 square miles, with a fertile soil and a population of 19,707 in 1910.

HAAS, häs, Hans (1868–). A German missionary to Japan. He was born in Donndorf, near Bayreuth, studied in the University of Erlangen, was ordained in 1894, and from 1898 to 1909 was pastor of German Evangelical congregations in Tokyo and Yokohama and director of the theological school of the German mission in Japan. In 1903–04 he taught in the Imperial University of Tokyo. He then returned to Germany and in 1913 became professor at the University of Jena. He wrote: *Geschichte des Christentums in Japan* (1902–04); *Die Sekten des japanesischen Buddhismus* (1905);

Der japanesische Buddhismus (1906; 2d ed., 1913); *Japans Zukunftsreligion* (1907; 2d ed., 1909); *Wie ein Japaner Christ wurde* (1907); "*Amida Buddha, unsere Zuflucht*" (1910); *Drei Buddhapriester* (1912); *China und Japan* (1912).

HAASE, hä′*ze*, Friedrich (1825–1911). A distinguished German actor. He was born in Berlin, the son of the first valet de chambre of Frederick William IV, under whose patronage he received a thorough education and was prepared for the stage by Ludwig Tieck. In 1846 he made his début at Weimar, acted there until 1848, then in Potsdam and Berlin, and rose to prominence during his connection with the theatre in Prague in 1849–51. His subsequent performances at Karlsruhe, Munich, and in 1855–58 at Frankfort, steadily increased his reputation, while starring tours made his name familiar in various countries of Europe, and an engagement at St. Petersburg during the six winters from 1860 to 1866 firmly established his position in the front rank of German actors. In 1869 he visited America; then was for one year a member of the Court Theatre in Berlin, and in 1870 succeeded Laube as director of the Stadttheater in Leipzig, and managed it cleverly to great pecuniary advantage for six years. Henceforth he made his home in Berlin and undertook only starring engagements, the most important of which was his tour through the United States as far as California in 1882–83. His distinguished appearance made him an apt impersonator of the aristocratic types in high comedy, which belong to the most brilliant parts of his repertory, and which he presented with original conception, exquisite refinement, and ingenious elaboration of character. Chief among these were Count Thorane in Gutzkow's *Königsleutnant*, Klingsberg the elder in *Die beiden Klingsberg*, Chevalier Rocheferrier in *Eine Partie Piquet*, and similar rôles. He is the author of *Ungeschminkte Briefe* and *Was ich erlebte 1846–1898* (Berlin, 1898). Consult Simon, *Friedrich Haase: Eine dramaturgische Studie* (ib., 1898).

HAASE, Heinrich Gottlob Friedrich Christian (1808–67). A German classical scholar, born at Magdeburg, Prussia. After studying at Halle, Greifswald, and Berlin, he made extensive researches in the libraries of Paris, Heidelberg, Strassburg, and Bern, in the Greek and Roman military writers. He was made professor of philology at the University of Breslau in 1840, and in 1851 became codirector of the Philological Seminary at the same institution, where he remained until his death. He was highly successful as a teacher. His most important publications are editions of Xenophon, *De Republica Lacedæmoniorum* (1833); Thucydides, with a Latin translation (1840); Velleius Paterculus, *Historia Romana* (1851 and 1858); Seneca (1852–53; 2d ed., 1872), a valuable work; and Tacitus, with admirable prolegomena (1855). Mention should be made of his article "Philologie," in Ersch and Gruber's *Allgemeine Encyklopädie*, and his *Die athenische Stammverfassung* (1857). He contributed valuable notes to the *Vorlesungen über lateinische Sprachwissenschaft* by Reisig. His *Vorlesungen über lateinische Sprachwissenschaft* (1874–80) was edited after his death by A. Eckstein and Hermann Peter and greatly stimulated research in the field of Latin philology. Consult: Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883); Fickert, *Friderici Haasii Memoria* (Breslau, 1868); Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

HAAST, häst, Sir Johann Francis Julius von (known in Germany as Julius von Haast) (1824–87). An English colonial geologist and explorer, born at Bonn, Germany. His scientific training was obtained at Bonn and in extended continental travel. In 1858 he went to New Zealand, where in the following year he was appointed by the provincial government to conduct explorations of Nelson and prepare reports on the natural history and geology of the region. During the execution of this task he discovered fields of coal and gold. He became government geologist of Canterbury Province in 1861, and as such he directed a 10 years' exploration of the interior of the island. His topographical and geological maps won for him the gold medal of the Royal Geographical Society. He also discovered the remains of the gigantic extinct birds *Dinornis* and *Palapteryx*. As an authority on glaciation, he was well known in scientific circles. In 1866 he founded the Canterbury Museum, which he enriched by exchanging moa bones with the museums of Europe for specimens he required. He was elected F.R.S. (1867) and published *Geology of the Provinces of Canterbury and Westland, New Zealand* (1879).

HABAK′KUK. The eighth of the minor prophets. Concerning his life nothing is known. In the deuterocanonical fragment, Bel and the Dragon, he is ordered to bring food to Daniel in the lions' den, and in order to carry out this command an angel seizes Habakkuk by the hair and transports him to Babylon; this is said to be in the time of Cyrus. But this legend is evidently later than the third century B.C. (see Daniel, Book of) and has no historical value. The Greek version gives his name as Ambakum; it has therefore been suggested that it is of Assyrian origin and connected with the word *hambuku*, which is the name of a garden plant, and that the original pronunciation was therefore Habbakuk. Such a name would point to the Chaldæan or early Persian period. The contents of the book ascribed to him do not give a clear idea of when he lived.

The Book of Habakkuk consists of six poetic utterances, viz., i. 2–4; i. 5–11; i. 12–17; ii. 1–3; ii. 4–17; and iii. 2–16. In the first poem the prophet complains of violence, lawlessness, and the overturning of the righteous by the wicked without divine interference. In the second he describes the advance of a terrible people swiftly conquering foreign nations, overthrowing their kings, and making a god of its own power. The third seeks for a divine purpose in allowing this enemy to fatten on nations mercilessly massacred. In the fourth he places himself in his watch tower to find a divine oracle, and the command comes to him to write down on tablets the vision which assures him that the end is coming, even though it seems to be delayed. The prophet then hurls a fivefold woe against the enemy for his ambition, greed, injustice, cruelty, and indecency. The last poem is a psalm in imitation of Deut. xxxiii, with a special superscription like those in the Psalter.

As to the historic situation that is reflected in this book, there is much difference of opinion. The Hebrew text in i. 6 refers to the Chaldæans. This has led to the idea that either the whole book or some part of it was written c.600 B.C.

There is so much, however, that seems to point to a later time that, e.g., Marti finds it impossible to ascribe to the prophet more than seven verses (i. 5–11). Budde, followed by Sellin, Moore, and others, has suggested that the wicked one is the Assyrian, and the avenger the Chaldæan, that i. 5–11 originally had its place after ii. 4, and that the date is c.615 B.C., while iii. 2 ff. is a late psalm added to the book. Duhm regards the entire book, aside from some short interpolations, as the work of a seer living in the time of Alexander and describing his career and the judgment on him: he supposes that i. 6 originally read "Kittæans," and not "Chaldæans." Ward looks upon some of the poems as coming from the Chaldæan period (c.600 B.C.), but the bulk of chap. ii as well as chap. iii as having been written in the Maccabæan age, Habakkuk being the name of the editor of the book. The chief difficulty with Duhm's view, which preserves the unity of the book, is that there is no textual warrant for changing the Chaldæans into Kittæans; but it is true that the description does not seem to suit the Chaldæans either in 615, 600, or any subsequent time, and that the woe against him who gives his friend to drink in order to see his nakedness and is told to intoxicate himself and show his uncircumcised condition (ii. 15 f.) would not be impossible reflections on Alexander's revels. In the original text the enemy may not have been named at all, as is the case with the Scythians in Zephaniah and Jeremiah, and only supplied afterward; or Habakkuk may have been a legendary figure, like Daniel, on whose lips it seemed proper to place oracles. Chap. ii. 18–20 is clearly an addition, and chap. iii has the appearance of having been taken from some collection of hymns where it was ascribed to Habakkuk, as Psalms cxlvi–cxlviii were once ascribed to Haggai and Zechariah. Consult the commentaries on the Minor Prophets (q.v.), and also Delitzsch, *De Habakkuk Prophetæ Vita atque Ætate* (Leipzig, 1842); Davidson, *Nahum, Habakkuk,* and *Zephaniah* (Cambridge, 1896); Duhm, *Das Buch Habakuk* (Tübingen, 1906); Ward, "Habakkuk," in *The International Critical Commentary* (New York, 1911); Moore, *The Literature of the Old Testament* (ib., 1913); Sellin, *Einleitung in das Alte Testament* (2d ed., Leipzig, 1914).

HABANA. See HAVANA.

HABANA, MARQUÉS DE LA. See GUTIÉRREZ DE LA CONCHA, JOSÉ.

HAB'ERTON, JOHN (1842–). An American editor and miscellaneous writer, born in Brooklyn. He was educated in southern Illinois, then learned the printing trade in New York, served in the Civil War, and did editorial work for the *Christian Union, Godey's Magazine,* and the New York *Herald.* He became well known through *Helen's Babies* (1876), widely circulated in America, England, France, and Germany, a slight but amusing account of children's fun and drollery. Among his other works may be mentioned: *The Barton Experiment* (1877); *Other People's Children* (1877); a drama, *Deacon Cranket; The Chautauquans* (1891); *All He Knew* (republished 1900); *The Tiger and the Insect* (1902); *Budge and Toddy* (1909).

HA'BEAS COR'PUS. In English and American law, a common-law process whereby a person kept in confinement may be brought before a superior court of justice, either to have the cause of his detention inquired into and its lawfulness determined or for some other specified purpose. As the purposes for which a person in custody might be required to be produced in court were various, several forms of the writ by which this result was effected were devised, and these were distinguished by adding to the mandatory words, *habeas corpus* (you are commanded *that you have the body* of the prisoner, etc.), the words designating the particular purpose for which the prisoner's presence was desired, as *ad subjiciendum* (that he may be disposed of), *ad testificandum* (that he may give evidence), *ad respondum* (that he may make answer), etc. That some such process emanating from the highest authority in the state must be resorted to in order to secure the presence in court, for any purpose, of a person in confinement is obvious. Such a person is unable to respond to the ordinary process of the courts, as a subpœna to testify in a pending lawsuit; and if his presence is to be obtained it can be only by the intervention of the superior authorities by some extraordinary process. The writ of habeas corpus is a process of this character. It issues in the name of the King or Queen (in the United States in the name of the people) and is for that reason, as being an exercise of the royal prerogative, known as a high prerogative writ. It issues out of one of the superior courts of judicature or, in vacation time, from a judge of such a court, and is usually of a summary character, i.e., requiring the immediate production of the prisoner before the court or the judge issuing the writ.

Of the various writs of habeas corpus formerly in use, seven in all, most have fallen into desuetude or have been abolished by statute, and only one, the writ of *habeas corpus ad subjiciendum,* has retained its preëminence. Its importance in the history of individual liberty, as an effective method of maintaining the reign of law by the protection of the individual against arbitrary arrest and imprisonment, is too well known to require statement. The writ of habeas corpus has come to be regarded as the glory of English and American law.

Habeas Corpus ad Subjiciendum. This is defined as a prerogative writ requiring the body of a person alleged to be unlawfully restrained of liberty to be brought before the judge or into court, that the lawfulness of the restraint may be investigated and determined. The writ is addressed to the person in whose custody the detained person is alleged to be and commands him to produce the body of the prisoner before the court and there state the cause and warrant for his detention or show cause why this was not done.

At the time when Magna Charta declared that no "freeman may be taken or imprisoned but by the lawful judgment of his peers or by the law of the land," there seems to have been no effective machinery available by which a freeman unlawfully imprisoned could recover his freedom. This was due partly to the fact that the judicial power was not yet fully centralized, partly to the fact that the King's Court (through which this was then to be accomplished if at all) was not yet ready to set at naught the King's will, and partly, perhaps, because the action for false imprisonment seemed a sufficient check on merely lawless confinement. The words "habeas corpus" are already making their way into various writs, but they do not definitely point to a specific method of investigating the cause or legality of an imprisonment.

A person arrested on a criminal charge was ordinarily set free as soon as sufficient sureties became bound for his appearance in court. It was not common to keep men in prison, not (apparently) because of any love of the abstract idea of liberty, but because imprisonment was costly and troublesome to the sheriff. The sheriff enjoyed a discretionary power of detaining or releasing prisoners upon sureties such as he considered sufficient, except that he might not set at liberty any one imprisoned by the special command of the King. A writ (*de homine replegiando*), which came into use during this period, directed the sheriff to deliver the prisoner unless he were taken at the special command of the King or his chief justiciar, or for the death of a man, or for some forest offense, or for some other cause which by law made him irrepleviable; but the writ was so worded as to throw upon the sheriff the responsibility of deciding whether the prisoner should be kept in custody or not.

In theory the central court (King's Court) exercised control over the entire province of criminal justice and at times directed a sheriff to send prisoners to Westminster for trial; but such instances were rare, and such orders issued generally from Chancery rather than from the justices and were governmental rather than judicial in their nature. Undoubtedly, also, if a man thought himself unlawfully imprisoned by the sheriff or by some lord of a franchise, and made himself heard in the King's Court, the justices of that court had power to order that his body be brought before them and to liberate him if persuaded that his imprisonment was unlawful.

Although in 1234 the royal court declared null and void the outlawry of Hubert de Burgh (q.v.), which the King had especially commanded, this victory of law over arbitrary power was gained only after a revolt and a change of ministry. In spite of this, a man committed to jail by the "mandate of the King" would have found none to liberate him. It was 200 years before the process of habeas corpus, as the appropriate instrument for enforcing the law of personal liberty granted by Magna Charta, became well established, and it was not until the reign of Charles II that the last vestige of the superior authority of the King's mandate disappears. In Darnel's case (3 Car. I, 1627) the judges declared that a return to a writ of habeas corpus directed to the warden of the Fleet Prison, which set forth that the prisoner was detained by warrant of the Privy Council, was a sufficient answer to the writ. As a result of the indignation consequent upon this subserviency of the judges to the King's will, the Petition of Right (16 Car. I, c. 10, § 8) was passed by Parliament, which provided that the writ of habeas corpus should be granted as of course to any person committed by the King or Privy Council upon demand made to the Court of King's Bench or Common Pleas, thus extending by statute the power of granting the writ to the Court of Common Pleas. In 1676 the court refused to grant a writ upon such a motion in vacation, and this resulted in the passing of the Habeas Corpus Act. The substance of the act is that the sheriff or other person having a prisoner in his custody shall, when a writ of habeas corpus is directed to him, bring the body of his prisoner into court, within a time fixed, with the true cause of his detainer or imprisonment, unless the commitment was for treason or felony plainly expressed in the warrant; that the writ of habeas corpus should be granted in vacation time by the Lord Chancellor, the writ to be returnable immediately and the prisoner to be discharged on giving security for his appearance before the proper court, except in case of persons committed for treason or felony expressed in the warrant of commitment, persons convicted or suffering execution by legal process, and persons detained upon a legal process or for an offense not bailable upon a justice's warrant; that persons discharged on habeas corpus should not be recommitted for the same offense except by the court having cognizance of the case; that persons committed to prison for treason or felony if not indicted and tried in or before the second term or session after commitment should be discharged; and that no inhabitants of England (except convicted felons and those contracting to be transported) should be sent as prisoners to Scotland, Ireland, Jersey, etc., or any place beyond the seas. Stringent penalties provided for a forfeit of £500 against a judge delaying the issue of the writ, with costs and damages of not less than £500, besides the penalties of præmunire for illegal transportation beyond seas.

This act was gravely defective in not extending the right to habeas corpus to cases other than those of persons arrested on criminal charges. This defect was not remedied until 1816, when an act (56 Geo. III, c. 100) was passed providing that the writ should be granted in other than criminal cases; that though the return might be good on the face of it, if the facts on which it was made appeared doubtful, the prisoner should be admitted to bail; and that the writ should run to harbors and roads on the coast, although not within any county. In 1861 it was decided that the writ ran throughout the British Empire, and the act 25 and 26 Vict., c. 20, was passed restricting the jurisdiction so that the writ should not run from the English court into those colonies or dominions where the granting of the writ by a local court had been provided for.

In the United States the right to the benefit of the writ of habeas corpus was always claimed by the English colonists in America and was enjoyed by them except in rare cases of arbitrary oppression. An instance of its early use occurs in New York in 1707, in procuring the release of certain ministers arrested under an illegal warrant issued by Governor Cornbury. In New Jersey in 1710 the Legislature by resolution denounced a judge who had violated the "undoubted right" of a colonist to the privileges of habeas corpus by refusing the writ to him. In 1692 the South Carolina Assembly adopted the Act 31 Car. II, and during the reign of Anne the act was expressly extended by act of Parliament to Virginia. Maryland in 1725 claimed the benefit of the writ as a "birthright of the inhabitants," independently of the royal favor. But, although the Colonial charters generally contained express provisions that the colonists should have all the privileges and immunities of natural-born British subjects, no express mention seems to have been made in them of the writ of habeas corpus. It was rather taken for granted as belonging of right to every British subject, and when the Colonies separated from the mother country, the right of habeas corpus became a part of the general common law of the States, derived by them from the laws existing while they were still Colonies. The Constitution of the United States (Art. I, sec. 9, subdiv. 2) provides that "the privilege of the writ of habeas corpus shall not be suspended unless when, in cases of rebellion or invasion, the public safety may require it." The constitutions of most of the States contain provisions of a similar effect; and in Virginia, Vermont, Louisiana, and North Carolina the suspension of the writ in any case is forbidden. The constitution of Maryland, however, does not mention the writ. Several of the States provide in their constitutions for suspensions in cases of grave public emergency, as in Massachusetts for 12 months, New Hampshire three months, Florida in case of insurrection or rebellion, etc.

As the Federal Constitution does not specify by what authority or in what manner the privileges of the writ may be suspended, President Lincoln claimed the right as an incident of the war power vested in the executive, and accordingly by proclamation in 1861 authorized the commanding general to suspend the writ. His action in so doing was severely criticized, and it was decided by Chief Justice Taney, in the Circuit Court of the United States, that Congress alone possessed the right to suspend the writ; and this seems to be the better opinion, although the right of the President was supported by leading constitutional lawyers at the time. Later, in March, 1863, Congress passed a bill authorizing the President to suspend the privilege of the writ; but in cases arising under the exercise of this authority it was held that the suspension of the privilege did not justify the courts in refusing to issue the writ but only suspended its further operation. Neither does the suspension of the privilege of the writ deprive an unlawfully arrested or imprisoned person of his action of damages for false imprisonment nor protect the wrongdoer from criminal prosecution. None of the States have exercised the constitutional power of suspending the writ except Massachusetts, where the privilege of the writ was suspended from November, 1786, to July, 1787, on the occasion of Shays's Rebellion.

In England, as noted above, the King's Court, or Court of King's Bench, and the Court of Chancery were the ordinary courts from which this writ was issuable; but it could be issued by the Court of Common Pleas and by the Court of Exchequer, at least in case of persons privileged in those courts. The Habeas Corpus Act (31 Car. II, c. 2) and other later acts prescribed the courts which could issue the writ, extending the jurisdiction so that it is always possible to obtain the writ in vacation as well as in term time.

In the United States the authority of the Federal courts is purely statutory in origin. The original statute defining the judicial power was the Judiciary Act, passed Sept. 24, 1789 (1 Stat. at L., 81, sec. 14), which provided "that writs of habeas corpus shall in no case extend to prisoners in gaol, unless they are in custody under or by color of the authority of the United States, or are committed for trial before some court of the same, or are necessary to be brought into court to testify." The jurisdiction created by this act, it is now settled, is vested exclusively in the Federal courts. Subsequent statutes have extended this jurisdiction to cases where the prisoner is in custody for an act done or omitted, in pursuance of a law or process of the United States (Rev. Stat., sec. 753), this being the general effect of the Act of March 2, 1833 (4 Stat. at L., 634), commonly called the Force Bill; to cases where the prisoner is held in violation of the Constitution, or a statute, or treaty of the United States, whether in a State or Federal court (Rev. Stat., sec. 753); "to all cases of any prisoner in jail or confinement who are subjects of a foreign state, and domiciled therein, who are confined or in custody under or by any authority or law, or process founded thereon, of the United States, or of any of them, for or on account of any act done or omitted under any alleged right, title, or authority, privilege, protection, or exemption set up or claimed under the commission or order or sanction of any foreign state or sovereignty, the validity and effect whereof depends upon the law of nations, or under color thereof" (Act of Aug. 29, 1842, 5 Stat. at L., 539; Rev. Stat., sec. 753).

These provisions do not grant to the Federal courts the authority by habeas corpus to discharge a prisoner from the custody of the State courts or officers where the prisoner is within the jurisdiction of the State authority by which he is imprisoned, merely because rights are involved which arise under the laws of the United States, since where there is a proper jurisdiction the State courts are equally bound with those of the Federal government, and are equally supposed to support and give effect to the Federal laws, and any erroneous ruling in this respect would involve an error of law, which could be remedied by a proper appeal to the Federal courts. But where the denial of right by the State court involves not only an error of law, but such a refusal as places the court in a position of acting without jurisdiction, as in acting under an unconstitutional State law, a basis is laid for the remedy of a writ of habeas corpus from the Federal court. This power of the Federal courts to grant the writ under the special grounds mentioned above is discretionary, and the writ is frequently refused in cases where the granting of it would tend to subvert the ordinary course of justice in the State courts.

The general function and purpose of the writ is to determine whether the person in whose behalf the writ is granted is detained or held in custody lawfully or unlawfully. The cases where the writ is used may be broadly classified as those where the person is detained without any legal process, and where he is held under some form of legal proceedings, which may or may not be lawful. The first of these classes is exemplified where a parent seeks to obtain the custody of a child under the control and in the custody of the other parent or some other person, and for that purpose obtains a writ in behalf of the child, setting up the illegal confinement of the child. Here the merits of the whole case must be heard and determined in order to decide to whom the custody of the child lawfully belongs. So, in the case of a person confined as an insane person, without legal process, the merits of the case must be heard and decided, both as to whether the person is insane, and if so whether the confinement is lawful. Where the confinement is under legal process, however, the purpose and function of the writ is to procure a hearing and determination as to the question whether the confining authority is lawfully exercising its jurisdiction or not. Mere irregularity does not necessarily deprive the court of jurisdiction; but when the irregularity is so material that no jurisdiction over the prisoner has been obtained for the purpose of confinement, then the prisoner will be discharged. In other words, generally speaking, the writ cannot be used to do away with the regular trial of an action, or to inquire into the merits of proceedings any further than this is necessary to determine the legality of the confinement complained of.

The procedure by which the writ is obtained, both at common law and under the various statutes regulating the subject, in some of the States, is by some form of petition or motion signed by the party or by some one acting in his behalf, setting up such facts as are necessary to make out a prima facie case. The person entitled to custody of one illegally detained by another, as a father deprived of his child, may himself apply for the writ. The courts of the Federal government in the United States have the discretionary right to withhold it; but in some of the States the writ must be granted, as in England, upon a proper petition or motion whenever a prima facie case for relief is presented by the petitioner.

The question as to when the Federal and when the State courts have authority in cases where their authorities clash with each other is determined by the general principles governing the conflict of laws between the two. For a discussion of that subject and of the method of return of the writ, the general principles of jurisdiction, etc., see the titles CONFLICT OF LAWS; CONSTITUTIONAL LAW; WRIT; JURISDICTION; ETC.

Habeas Corpus ad Faciendum et Recipiendum. A writ by which a superior court commands an inferior court to produce the body of a defendant, together with the cause (whence the writ is also called a *habeas corpus cum causa*) or grounds of his being taken and held, there to do and receive whatsoever shall be adjudged of him in the superior court. The writ is sometimes used in the United States.

Habeas Corpus ad Prosequendum. A writ issued to remove a prisoner for trial in the jurisdiction where the act was committed.

Habeas Corpus ad Respondendum. A writ for bringing up a prisoner from a lower court to be charged with a new offense.

Habeas Corpus ad Satisfaciendum. A writ used to bring up a prisoner to a superior court to charge him with process of execution (q.v.) upon a judgment.

Habeas Corpus ad Testificandum. A writ used to bring a witness into court when he is in custody at the time of the trial. It directs the sheriff to have his body in court. The power to issue writs of *habeas corpus ad testificandum* in cases where it is necessary to bring prisoners into court to testify, is vested in the Federal courts by the General Judiciary Act of 1789.

Consult: Church, *Habeas Corpus, with Practice and Forms*, containing an extended account of its history in the United States (2d ed., San Francisco, 1893); Spelling, *A Treatise on Injunctions and other Extraordinary Remedies* (2d ed., Boston, 1901); the commentaries of Kent, Story, Blackstone, and Stephen; *Encyclopædia of the Laws of England* (London, 1907); Dicey, *The Law of the Constitution* (ib., 1908); W. F. Bailey, *Treatise on the Law of Habeas Corpus and the Special Remedies* (Chicago, 1913); and the authorities referred to under CONSTITUTION; CONSTITUTIONAL LAW; CONFLICT OF LAWS; WRIT; ETC.

HABEN'DUM. A technical term in the common law of conveyancing, to describe the part of a grant, or deed of lands, which immediately follows the description of the premises conveyed. This was formerly written in Latin, *habendum et tenendum* (to have and to hold), whence the name of the clause. Though not essential to the validity of a conveyance, it is still commonly employed in the English form of the words. Its purpose is to qualify or define the estate granted, as "to have and to hold, to the said John Doe (the grantee), his heirs and assigns forever," whereby a fee simple is created; or "to the said John Doe and the heirs of his body," showing the estate granted to be a fee tail. Where the *habendum* is clearly repugnant to the "granting part" of a deed, it will be rejected, but if it be consistent with the grant it will control it. See CONVEYANCE; DEED; GRANT.

HABENECK, àb'nĕk', FRANÇOIS ANTOINE (1781–1849). A French violinist and conductor, born at Mézières. He entered the Conservatory in Paris (1801), where he studied under Baillot and obtained the first violin prize (1804). Afterward he was appointed first violin at the Opéra, and he served as director (1806) and conductor of the orchestra from 1821 to 1824. For 20 years, beginning in 1806, he conducted the Société des Concerts du Conservatoire and was made permanent conductor in 1828. These concerts attained a European celebrity, and by means of them he introduced Beethoven's symphonies into France. He composed two concertos, compositions for the violin, and several songs. Among his pupils were Alard and Léonard.

HABER, hä'bĕr, FRITZ (1868–). A German chemist, born at Breslau. He was educated at Berlin, Heidelberg, and Charlottenburg. In 1894 he became an assistant in a technical school, and from 1896 to 1911 he was lecturer, assistant professor, and professor at the technical Hochschule at Karlsruhe. Thereafter he served as professor of physical chemistry and director of chemical investigations at the University of Berlin. With Dr. Carl Bosch he invented in 1911 a synthetic process of manufacturing ammonia. See AMMONIA. Besides his articles on ammonia in the *Zeitschrift für Elektrochemie* and in other technical journals, he is author of *Grundriss der technischen Elektrochemie* (1898) and *Thermodynamik technische Gasreaktionen* (1905), the latter translated into English by Arthur B. Lamb as *Thermodynamics of Technical Gas-Reactions* (1908).

HABERL, hä'bĕrl, FRANZ XAVER (1840–1910). A Catholic clergyman and writer on music, born at Oberellenbach, Lower Bavaria. He was ordained to the priesthood in 1862, in which year he was also appointed conductor of music at the cathedral of Passau and musical director of the Catholic Seminary in that city. During the period 1867–70 he was organist of the church of Santa Maria dell' Anima at Rome, and from 1871 to 1882 served in a similar capacity at Ratisbon. In 1875 he founded in that city the celebrated School for Church Music, which under his management became one of the leading institutions of its kind. In 1880 Haberl assumed the editorship of the periodical entitled

Musica Sacra. He was also chief editor of the splendid edition of the works of Palestrina, published by Breitkopf and Härtel (Leipzig, 32 vols., completed in 1894). A Palestrina Society was established by him in 1879. The following are a few of his principal publications: *Magister Choralis* (1865; 10th ed., 1893; trans. into English, Spanish, French, and Italian); *Cäcilien-Kalendar* (1876–85; since 1886 published as *Kirchenmusikalisches Jahrbuch*); *Psalterium Vespertinum* (8th ed., 1901); *Bibliographischer und thematischer Musikkatalog des päpstlichen Kapellarchivs im Vatikan zu Rom* (1888).

HABERLANDT, hä′bĕr-länt, Gottlieb (1854–). An Austrian botanist, born at Ungarisch-Altenburg, Hungary, and educated at Vienna and Tübingen. In 1884 he was appointed professor of botany at the university at Graz, where he also became director of the Botanical Institute in 1888; and in 1891 he made a scientific tour through Java. In 1910 he took charge of the Botanical Gardens of Berlin and also accepted a professorship in the university of that city. His publications, mainly on the physiology and ecology of plants, include: *Die Entwickelungsgeschichte der mechanischen Gewebesystems der Pflanzen* (1879); *Vergleichende Anatomie des assimilatorischen Gewebesystems der Pflanzen* (1881); *Die physiologische Leistungen der Pflanzen-gewebe* (Shenk's Handbuch, 1882); *Physiologische Pflanzenanatomie* (1884; 4th ed., 1909); *Das reizleitende Gewebesystem der Sinnpflanzen* (1870); *Eine botanische Tropenreise* (1893; 2d ed., 1910); *Sinnesorgane im Pflanzenreich zur Perception mechanischer Reize* (1901; 2d ed., 1906); *Perception des Lichtreizes durch das Laubblatt* (1904).

HÄBERLIN, hā′bĕr-lēn, Karl Friedrich (1756–1808). A German authority on constitutional law. He was born and educated at Helmstedt and was professor of German constitutional law at Erlangen (1782–86) and Helmstedt (1786–1808). His fame rests chiefly on his *Handbuch des deutschen Staatsrechts* (2d ed., 1797) and *Das deutsche Staatsarchiv* (16 vols., 1796–1808), which contain valuable essays and treatises on constitutional and statistical affairs.

HABIB ULLAH. Ameer of Afghanistan (q.v.).

HABICHT, hä′bĭkt, Ludwig (1830–1908). A German novelist, born at Sprottau. After 1881 he lived for many years in Italy. He wrote: *Der Stadtschreiber von Liegnitz* (2d ed., 1881); *Schein und Sein* (2d ed., 1878); *Er muss studieren* (1896); *Widersprüche* (1899); *Besondere Kennzeichen* (1902); *Wahrheit* (1902).

HABIETINEK, hä-bē̍′tĭ-nĕk, Karl (1830–). An Austrian statesman, born in Prague. He graduated at Prague University (German) in 1855, in 1858 was appointed lecturer in Austrian civil law at Vienna, from 1864 to 1868 was at Prague as professor of civil law and the law of trade and exchange, and from 1868 to 1871 occupied a similar chair at Vienna. In 1871 he was for a time Minister of Justice, in 1879 became a life member of the Upper House of the Reichsrat, and in 1881 vice president of the Reichsgericht, a tribunal for the settlement of conflicts between the ordinary administrative courts and the special court for government officials. He was vice president of the Supreme Court of Justice and Cassation from 1881 to 1899 and in the latter year was appointed its president. He retired in 1904.

HAB′INGTON, William (1605–54). An English poet, born at Hindlip, Worcestershire, of Roman Catholic parentage. He was educated at Saint-Omer and Paris, but declined to become a Jesuit, and returned to England. He married Lucy Herbert, youngest daughter of Lord Powis, and retired to his ancestral estate. Habington addressed to his wife, under the name of Castara, a series of beautiful lyric poems, distinguished from similar contemporary work by their purity of tone. His tragi-comedy, *The Queene of Arragon*, appeared in 1640. To the volume entitled *Castara* (1634) additions, including religious poems, were made in 1635 and 1640. Consult Arber, *English Reprints* (London, 1870), and Ward, *English Poets*, vol. ii (ib., 1880–83).

HAB′IT (from Lat. *habitus*, condition, from *habere*, to hold). In its most extended sense, a settling of any plastic material into determinate form. Since the organism at large, and the nervous system in particular, are characterized by nothing so much as by plasticity, more especially during the years of growth that precede maturity, it is clear that habit must play an important part in biology as well as in the sciences of mind (psychology, ethics) that follow upon biology. Habit, in this technical sense, is common both to man and to the lower animals. It may be defined as a "fixed tendency" acquired by an organism during its lifetime; it should therefore be clearly distinguished from reflexes and instincts (q.v.), which have been acquired before birth. In biology habit is chiefly important as one of the concepts for the explanation of the behavior of the organism. In psychology, on the other hand, the term has served as an explanation of the rise and course of mental processes; though of recent years it has been largely replaced by the terms "disposition" (q.v.) and "tendency." (See Determining Tendency.) Furthermore, both biology and psychology are interested in the course of the acquisition of a habit. The former notes the simplification of the movements required to achieve a given result, the increased accuracy of the movements, and the diminished tendency to fatigue. Psychology, on its side, is concerned with the nature of the conscious patterns present at various stages in the formation of a habit; analysis of the formation of an habitual movement results, e.g., in the psychology of impulsive, sensorimotor, and automatic action. (See Action.) Moreover, in animal psychology, the rate at which a habit is acquired (the time consumed, the number of repetitions, the dropping of useless movements, etc.) has become an important index of the mentality of the animal. See Learning in Animals.

Finally, the explanation of habit must be sought in physiology. The formation of the simplest habit is the formation of simple sensorimotor coördinations. In the acquisition of a skillful act, such as piano playing, typewriting, etc., the simple coördinations are first brought together in complex or integrated groups of coördinations. Gradually the longer series are short-circuited or abridged; ideas which at first accompanied the voluntary direction of the various movements drop out; and at last the whole movement follows automatically when touched off by a single stimulus. Physiologically regarded, habit thus implies that nervous functions are relegated by the higher to the lower (automatic) centres; the cortex is relieved of so many burdens and is free for so many new combinations. Psychologically regarded, it implies the possibility of mental progress: what we have learned becomes a matter of course with us, unconsciously utilized when the right cue is given; so that we can drop, without fear of forgetting, the topic that we have been working upon and proceed to new acquisitions upon the organized basis of previous effort.

Consult: James, *Principles of Psychology* (New York, 1890); Carpenter, *Mental Physiology* (London, 1888); Huxley, *Lessons in Elementary Physiology* (New York, 1896); Colvin, *The Learning Process* (ib., 1911); Titchener, *Text-Book of Psychology* (ib., 1910). For ethical implications, consult Wundt, *Ethics* (ib., 1897).

HABITA'TION. See HOUSE.

HABIT'UAL CRIMINAL. One whose habit of indulging in criminal acts has been established by previous convictions. In some of the United States there are statutes fixing three convictions as the minimum number required to constitute one an habitual criminal or offender, and, in the absence of legislative definition, this number is sufficient to make out a case of habitual or common criminality. In other States, one previous conviction of a felony or five convictions of a misdemeanor warrant a judgment of habitual criminality. It is the present policy of the criminal law, in European countries as well as in the United States, to punish an habitual offender more severely than a first transgressor. Accordingly modern legislation provides a sliding scale of punishments for persons convicted of crime. For the first offense a mild penalty is imposed, while a heavier penalty is inflicted with each repetition of the same offense. (See SENTENCE.) In some States it is provided that the person of an habitual criminal shall be at all times subject to the supervision of every judicial magistrate of the county, and of the overseer of the part of the town where the criminal may be found, to the same extent that a minor is subject to the control of his parent or guardian. Consult Bishop, *New Criminal Law* (Chicago, 1892), and Blackburn *v.* State, 50 Ohio St., 428 (1893).

HABITUAL DRUNKARD. In ordinary language a drunkard is one who has the habit of getting drunk, and the term "habitual drunkard" is therefore tautological; but the term has a technical legal sense as applied to a person who has become so confirmed in this habit of getting drunk as to render him a proper subject of legal guardianship, analogous to that exercised over insane persons, under provisions of statutory law.

The law of the State of New York is typical of this class of legislation. Under it the proceedings for the appointment of a guardian, commonly known as a committee, of a person as an habitual drunkard involves an inquest, or judicial inquiry by a jury, into his character and habits, as in the case of insane persons. The committee, when appointed, has charge, not only of the estate of the drunkard, but also, subject to control of the court, of his person, so that he can fix his residence and otherwise determine his method of living.

A finding of habitual drunkenness upon the inquest deprives the habitual drunkard of his capacity to bind himself by contracts, even when sober; but it does not incapacitate him from making a valid will if at the time of its execution he was "of disposing mind." See DRUNKENNESS, and consult the authorities there referred to.

HACHETTE, à'shĕt', JEAN NICOLAS PIERRE (1769–1834). A French mathematician, born at Mézières (Ardennes). He studied at Charleville and at Rheims and taught at Rocroy (1787), Mézières (1788–92), and at the Collège de Collioure (1793). On the founding of the Ecole Polytechnique in Paris, in 1794, he was given a subordinate position and in 1797 was called to the chair of descriptive geometry in this institution. In 1810 he was nominated to a professorship in the university, but for political reasons the government refused to confirm the nomination. His first election, in 1823, to the Academy of Sciences also failed of confirmation, although he was finally, in 1831, successful in securing a seat. Hachette was a prolific writer on mathematical topics, his memoirs appearing in the *Journal de l'Ecole Polytechnique,* in the *Correspondance de l'Ecole Polytechnique* (Paris, 1817, 3 vols., which he edited), in *Crelle's Journal,* and in various other scientific publications. He also wrote a number of works, among which the following are the most prominent: *Traité élémentaire des machines* (1809; 2d ed., 1828); *Programme d'un cours de physique* (1809); *Eléments de géométrie à trois dimensions* (1817); *Traité de géométrie descriptive* (1822; 4th ed., 1828); *Histoire des machines à vapeur* (1830). For a list of the memoirs of Hachette, consult *The Catalogue of Scientific Papers of the Royal Society,* vol. iii (London, 1869). For a biographical sketch, consult Arago, *Œuvres,* vol. iii (Paris, 1855).

HACHETTE, JEANNE LAÎNÉ (c.1454–?). A French heroine. So little is known of her family that it is impossible to say whether she was the daughter of an officer named Fourquet by whom she was confided to the care of Dame Mathieu Laîné, or was in truth the child of the latter and her husband, a simple workman of Beauvais. In 1472, when she was about 18 years old, Charles the Bold of Burgundy invaded France and endeavored to take Beauvais by storm. As the town was garrisoned by but 300 men, the inhabitants, men and women, defended the walls and succeeded in repelling the first assault of the Burgundians. The second assault, however, was more determined, and a standard bearer had succeeded in reaching the top of the rampart and had planted his flag, when Jeanne struck him dead with a hatchet (*hachette*) and captured the banner. This so disheartened the assailants that they again withdrew, and as reënforcements soon after entered the city, Charles decided to raise the siege. King Louis XI not only rewarded Jeanne by marrying her to the man of her choice and decreeing that they and their descendants should be free from the payment of all taxes, but excused the other citizens from the payment of the poll tax, gave many privileges to the women of Beauvais, and instituted an annual procession to take place on the day of St. Angadrême, the patroness of the city, in which the flag captured by Jeanne was carried by some woman of her family. In 1851 a statue was erected to her memory in the principal square of Beauvais.

HACHETTE, LOUIS CHRISTOPHE FRANÇOIS (1800–64). A French publisher, born at Rethel in the Ardennes. He began to prepare himself to be a teacher, but having been dismissed, owing to his politics, in 1822, entered a school of jurisprudence. This he quitted in 1826 to become a publisher in Paris, with the avowed object of issuing books to improve pedagogics and to elevate the general intelligence of the people. This aim he pursued throughout his life, and the numerous series of works that he published in every department of knowledge gave him not only a national but a world-wide reputation as a moral educator and as a disseminator of wholesome literature. Noteworthy among his publications are scientific and miscellaneous libraries, editions of various classics, dictionaries of modern languages, dictionaries of universal reference, and *Le Journal pour Tous,* a weekly periodical founded in 1855. He was the author of several pamphlets on the economic condition of the poor and their betterment and was greatly interested in the establishment of coöperative friendly societies among the industrial classes. He was also one of the early promoters of international copyright.

HACHIOJI, hä'chē-ō'jē. A town of Japan, situated on the island of Nippon, 23 miles by rail from Tokyo (Map: Japan, F 6). It is an important centre of the silk industry. It has a rapidly increasing population of 35,000.

HACK'BERRY (variant of *hagberry, hegberry,* from *hag,* AS. *haga,* Dutch *haag,* Ger. *Hag,* fence, coppice + *berry*), also called SUGAR BERRY, NETTLE TREE, HOOP ASH, and HAGBERRY. A number of trees and shrubs which belong to the nettle family, the species of which are distributed throughout the Northern Hemisphere. The best-known species are *Celtis occidentalis* and *Celtis mississippiensis* of the United States. The former ranges from Canada to Tennessee and westward to the Pacific. It is a large tree, which attains a height of 120 feet or more and 3 feet in diameter. In habit of growth the tree somewhat resembles the white elm, but the bark is rougher, and the branches are nearer the horizontal. It is of rapid growth and is well adapted to park and general planting. The wood is heavy, rather soft, and coarse-grained. The heartwood is brown, the thick sapwood yellow. It is adapted to about the same uses as the elm. The second species is a somewhat smaller tree of more southern range. *Celtis australis,* sometimes called lotus tree and nettle tree, is a species common in the Mediterranean region and found in India. It attains a height of 60 feet or more, but is not hardy in the north. Its wood is extensively used for furniture, carving, etc., and its drupelike fruits are edible. *Celtis bungeana,* a North China species, with dark-green glossy leaves, is a hardy tree in northern latitudes.

HACK'EE (in imitation of the cry of the animal). A name for the chipmunk (q.v.), found in the books of Richardson, Godman, Audubon, and other early writers, and perhaps once in popular use in the Southern States, but now rarely heard. The same may be said of "chickaree," a name given to the red squirrel (*Sciurus hudsonicus*), according to Audubon, on account of its chattering note.

HACK'ENSACK. A village and the county seat of Bergen Co., N. J., 14 miles north of Jersey City, on the Hackensack River, and on the New Jersey and New York, and the New York, Susquehanna, and Western railroads (Map: New Jersey, E 2). It is primarily a residential town and has the Johnson Public Library, Hackensack Hospital, county courthouse and jail, and an Old Ladies' Home. The principal industrial establishments are silk mills, a jewelry factory, and a wall-paper factory. The government is vested in a board of commissioners, elected from the village wards for a term of three years. Hackensack was settled by the Dutch, about 1640, near a village of the Hackensack Indians, and in 1678 a company of Huguenots settled near here on what was known as the French Patent. Washington stopped here on his retreat across New Jersey in 1776, and the place was subsequently occupied by the British and Hessians. Hackensack was incorporated in 1868. Pop., 1900, 9443; 1910, 14,050; 1914 (U. S. est.), 16,011.

HACK'ER, FRANCIS (?–1660). An English regicide. He was a zealous supporter of Parliament and later of Cromwell during the Civil War and the Protectorate and distinguished himself in several battles. He commanded the soldiers who guarded Charles I during his trial, had charge of the execution, and signed the executioner's order. During the Scottish War he commanded a regiment under Cromwell and later represented Leicestershire in the Parliament of Richard Cromwell. After the Restoration he was sent to the Tower and was hanged on Oct. 19, 1660. Consult *The Speeches and Prayers of Some of the late King's Judges* (London, 1660).

HACK'ET, JOHN (1592–1670). An English ecclesiastic. He was educated at Trinity College, Cambridge, and was ordained in 1618. He remained loyal to the King during the Civil War, but was permitted to stay in England until the Restoration in 1660 placed the Stuarts again on the throne. The next year he became Bishop of Coventry and Lichfield. Among his publications are *Loyola* (1648), a Latin comedy of small merit, and a life of Archbishop Williams (1693). Consult Plume, *Life of Hacket,* reprinted with additions by Mackenzie Walcot, B.D. (London, 1865).

HACK'ETT, HORATIO BALCH (1808–75). An American biblical scholar, born in Salisbury, Mass. He graduated at Amherst in 1830 and studied theology at Andover and in Germany. He was (1835) professor of Latin and Greek at Brown University and in 1839 was chosen to the chair of biblical literature in the Newton Theological Institution, where he remained for 30 years. In 1870 he was made professor of New Testament Greek in the Rochester Theological Seminary. He was one of the most distinguished biblical scholars in the Baptist church and a notable exegetist. His works include an edition with notes of Plutarch's *De Sera Numinis Vindicta* (1844); *Illustrations of Scripture Suggested by a Tour through the Holy Land* (1855); a translation of *Philemon* (1860); *Christian Memorials of the War* (1864); an edition of *Rawlinson's Historical Illustrations of the Old Testament* (1873); and other translations for the American edition of Lange's *Commentary.* With Ezra Abbot he edited the American edition of Smith's *Bible Dictionary* (1868–70). Consult Whittemore, *Memorials of Horatio Balch Hackett* (1878).

HACKETT, JAMES HENRY (1800–71). A noted American comedian. He was born and brought up in New York City. After his early marriage to an actress, Miss Lee-Sugg, and a failure in business, he went upon the stage, first in 1826, and rapidly earned a prominent position, especially in eccentric characters. Among his impersonations best known were Justice Woodcock, Sylvester Daggerwood, Mons. Morbleu, Dromio, Rip Van Winkle, Nimrod Wildfire, Sir Pertinax McSycophant, and, above all, Falstaff, in which in this country he had no peer. He played with success in England and in all parts of the United States, besides managing at different times several theatres. Before his death he made a fortune. He was the author of *Notes and Comments on Shakespeare* (1863). Consult Ireland, *Actors and Actresses of Great Britain and the United States,* edited by Matthews and Hutton, vol. iii (New York, 1886).

HACKETT, James Keteltas (1869–). An American actor and manager, son of James Henry Hackett. He was born at Wolfe Island, Ontario, and graduated from the College of the City of New York in 1891. He first appeared in 1892 and after several engagements became, early in 1896, leading man at the Lyceum, a position which he held till 1899. Later he became one of the few independent managers in this country. His greatest successes were in *The Prisoner of Zenda* (1896), its sequel, *Rupert of Hentzau* (1898), and *The Pride of Jennico* (1900). Other plays in which he appeared are: *Don Cæsar's Return* (1901); *The Crisis* (1902); *The Walls of Jericho* (1906); *Samson* (1909); *The Grain of Dust* (1912). In 1897 he married the actress Mary Mannering and in 1911 Beatrice Mary Beckley. Consult Strang, *Famous Actors of the Day in America* (Boston, 1900), and William Winter, *The Wallet of Time* (2 vols., New York, 1913).

HACK'ETTSTOWN. A city in Warren Co., N. J., 58 miles west of New York City, on the Delaware, Lackawanna, and Western Railroad, the Morris Canal, and on the Musconetcong River (Map: New Jersey, C 2). It is the seat of Centenary Collegiate Institute, rebuilt in 1901, and contains a State fish hatchery and public libraries. The industrial establishments include silk and embroidery mills, leather factories, and saw mills. The water works are owned by the city. Pop., 1900, 2474; 1910, 2715.

HACKLÄNDER, hȧk'lĕn-dẽr, Friedrich Wilhelm von (1816–77). A mediocre German novelist and dramatist, born at Burtscheid. He won a wide reputation by his *Bilder aus dem Soldatenleben* (1841) and *Das Soldatenleben im Frieden* (1844). The keen observation and lively humor of the first of these books brought him an invitation to accompany Baron von Taubenheim to the Orient, as a result of which he wrote *Daguerreotypen* (1842), later known as *Reise in dem Orient* (1846), and *Pilgerzug nach Mekka* (1847), a collection of Oriental legends and tales. From his experiences in the Piedmont campaign resulted the *Bilder aus dem Soldatenleben im Krieg* (1849–50). In 1855 he founded the popular weekly, *Ueber Land und Meer.* Of his other works, the more noteworthy are: *Der geheime Agent* (1850), a very popular and often translated comedy; *Wachtstubenabenteuer* (1845), scenes of military life; *Handel und Wandel,* a humorous novel (1850); *Namenlose Geschichten* (1851). Hackländer left an autobiography, *Der Roman meines Lebens* (Stuttgart, 1878). His complete works appeared in 60 volumes (1855–74). Consult Morning, *Erinnerungen an Hackländer* (Stuttgart, 1878).

HACK'LE, HECK'LE, or **HATCH'ELL** (from Dutch *hekel,* heckle, from Dutch *haak,* hook). An instrument for cleaning, sorting, and straightening the fibres of raw flax, hemp, and jute preparatory to spinning. See Flax.

HACK'MANN, Heinrich (Friedrich) (1864–). A German Orientalist, born in Osnabruck and educated at the universities of Leipzig and Göttingen. He was lecturer at Göttingen in 1890–94, pastor of a German church in Shanghai in 1894–1901 and (after two years' travel in Asia) of the Denmark Hill German Church, London, in 1904–10, and in 1913, after another long stay in the Orient, became professor of the history of religion in the University of Amsterdam. Among his published works are: *Vom Omi bis Bhamo* (1905; 2d ed., 1907); *Missionsarbeit in China einst und jetzt* (1906); *Buddhismus* (1905; Eng. trans., 1910); *Welt des Ostens* (1912), which appeared in English as *A German Scholar in the East* (1914).

HACK'MATACK. See Larch.

HACK'NEY. A metropolitan borough of London (q.v.) in the County of London, 3 miles northeast of St. Paul's (Map: London, D 8). It was formerly a favorite suburban village residence of London citizens and in its fashionable days is said to have given its name to hackney coaches. Pop., 1901, 219,110; 1911, 222,533.

HACO. See Haakon.

HA'DAD. One of the chief deities of ancient Syria and Assyria, apparently of Aramæan origin. The name of this deity occurs in several compound names in the Bible, viz., Hadadezer (2 Sam. viii. 3 et al.), Ben Hadad (1 Kings xv. 18 et al.), and Hadad-Rimmon (Zech. xii. 11); is found in the name Bar Hadad (q.v.) in the inscription of Zakir, King of Hamath; and is mentioned by Microbius (*Saturnalia,* i, 23, 18). The god is identical with Adad, who appears among the great gods of Babylonia and Assyria. Through cuneiform documents it is likewise clear that Hadad-Adad was a storm god, who was also known by various epithets, such as Ramman (thunderer), Bir, and Dadda, though in Syria he is a solar deity. Hadad also appears in the Old Testament as the name of various kings or princes of Edom (Gen. xxxvi. 35; 1 Chron. i. 50; 1 Kings xi. 14).

HADADEZER, hăd'ăd-ē'zẽr. King of Zobah, an Aramæan state, in the eleventh century B.C. (2 Sam. viii. 3). Zobah is probably identical with the Assyrian *Zubiti,* which seems to have been situated north of Damascus and east of Hamath. Hadadezer is said to have been a son of Rehob. His name is apparently identical with Hadadidri (Hadad is my help), which occurs in an Assyrian inscription of Shalmanezer III (860–825 B.C.). According to 2 Sam. viii. 3–12, Hadadezer was defeated by David, although the Aramæans of Damascus came to his assistance, and the gilded armor of his servants was carried to Jerusalem. Vessels of bronze were also captured in the cities of Betah and Berotai, which belonged to Hadadezer. The location of these towns cannot be determined at present. After the battle Toi, King of Hamath (q.v.), sent his son Joram to congratulate David, because he had himself been at war with Hadadezer. A later narrative, found in 2 Sam. x. 15–19, gives an account of a second campaign by David ending with a defeat of Hadadezer at Helam (probably Alima, east of the Jordan). One of Hadadezer's servants named Rezon fled from his master and became the founder of a new dynasty at Damascus (1 Kings xi. 23). Consult: Winckler, *Geschichte Israels* (Leipzig, 1895); the commentaries on Samuel by Klostermann (Nördlingen, 1887), Henry Preserved Smith (New York, 1899), Budde (Tübingen, 1902), Nowack (Göttingen, 1902); and Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

HADAMARD, ȧ′dȧ′mȧr′, Jacques (Salomon) (1865–). A French mathematician, born at Versailles. In 1884 he entered the Ecole Normale, where he became licentiate, fellow, and finally doctor of science in 1892. He became professor at Bordeaux in 1897, then lectured at Paris, and later held professorships at the Collège de France and the Ecole Polytechnique. His mathematical researches cover a wide field, but he is known more especially for his work on the theory of functions and the theory of numbers, on the integration of differential equations of mechanics and physics, and on the latest problems of the functional calculus. He is author of more than 200 memoirs published in various scientific journals and also of *Leçons de géométrie élémentaire* (2 vols., 1898–1901); *Leçons sur la propagation des ondes et les équations de l'hydrodynamique* (1903); *Leçons sur le calcul des variations* (1910).

HA-DANI, hä-dä′nē. A Jewish traveler of the ninth century. See Eldad Ha-Dani.

HAD′DAN, Arthur West (1816–73). An English ecclesiastical historian, born at Woodford in Essex. He was educated at Brasenose and Trinity colleges, Oxford, where he afterward became a fellow. He was ordained a priest in the Established church in 1842. The High Church revival at Oxford, which occurred during his residence there, enlisted his warmest support, and in 1869 he published his *Apostolic Succession in the Church of England*, which was reprinted in 1879 and in 1883 and remains the best work on the subject. Among his other publications are *Councils and Ecclesiastical Documents* (1869–73).

HAD′DINGTON. The capital of Haddingtonshire, Scotland, on the banks of the Tyne, 16 miles east of Edinburgh (Map: Scotland, F 4). It is an important grain market and possesses the second largest corn exchange in Scotland. Other industries include brewing, tanning, milling, and coach building. Noteworthy buildings are the old Abbey Church, the Lucerna Laudoniæ (Lamp of Lothian), the county buildings, town hall, and the Knox Memorial Institute. Haddington is a very ancient royal burgh, its charter dating from the eleventh century. It owns its water works. King Alexander II (born 1198), John Knox, John Brown and his grandson Samuel Smiles, and Mrs. Jane Carlyle, who is buried in the ruined choir of the parish church, were natives of Haddington. Pop., 1901, 3992; 1911, 4140.

HAD′DINGTONSHIRE, or East Lothian. A maritime county in southeastern Scotland, bounded north and east by the Firth of Forth and the North Sea, south and southeast by Berwickshire, and west by Midlothian (Map: Scotland, F 4). Area, 267 square miles. In the southern part are the Lammermuir Hills, rising to the height of 1732 feet. The chief river is the Tyne, which flows northeast across the county into the sea at Tyningham. Haddingtonshire has enjoyed high agricultural fame since the seventeenth century, but a large area is under timber. Coal is mined at various points. The principal towns are Haddington (the capital), Dunbar, and North Berwick. Pop., 1911, 43,253.

HAD′DO (American Indian). A local name on Puget Sound for the humpbacked salmon.

HAD′DOCK. A fish (*Melanogrammus æglefinus*) of the cod family. It resembles the common cod very much, but can readily be distinguished by the black lateral line, that of the common cod being white. It has three dorsal and two anal fins, and a barbel at the symphysis of the lower jaw. There is a black spot behind each of the pectorals, these spots sometimes extending so as to meet on the back. A legend ascribes these spots to the finger and thumb of St. Peter and says the haddock is the fish from the mouth of which he took the tribute money.

This valuable fish is abundant on both coasts of the north Atlantic southward to France and North Carolina, but does not range so far north as the cod, though abundant about Iceland. They consort with the cod, but seem to be much more gregarious and swim about in large schools. Some years they are far more rare at the fishing grounds than in others. As they live very largely on mollusks, they are likely to be numerous on the clam banks; and in their feeding and habits generally they closely resemble the cod, varying mainly in the practice of keeping close to the bottom. In April they approach the shore and spawn. They remain near the shore about six weeks and then return to deep water. An ordinary female will produce annually more than a million eggs, resembling those of the cod, and to be treated in the same way in fish culture. The haddock fishery is of great importance on both coasts. This species, which usually weighs about six pounds, is especially salable in the markets of Boston and Philadelphia and is one of the easiest to transport in ice. They are also smoked successfully, after the Scottish method, which produces "finnan haddie" (Finland haddock). See Plate of Codfish and Allies.

HADDOCK, Sir Richard (1629–1715). An English admiral, son of William and grandson of Richard Haddock, both of whom were officers in the English navy. He commanded ships in various actions during the wars with Holland from 1657 to 1674 and in the battle of Solebay (May 28, 1672) fought his ship, the *Royal James*, so gallantly that when he was presented to the King after his return to England, the latter, as a mark of favor, took off the cap he was wearing and put it on Haddock's head. He was knighted in 1675 and in 1690, after the battle off Beachy Head, was made admiral, and, in conjunction with Henry Killigrew (q.v.) and Sir John Ashby, joint commander of the fleet.

HAD′DON, Alfred Cort (1855–). An English ethnologist. He was born in London and was educated at Christ's College, Cambridge. In 1880–1901 he was professor of zoölogy in the Dublin Royal College of Science and then was chosen fellow of Christ's at Cambridge. In 1900–09 he was Cambridge lecturer in ethnology and in 1904–09 lectured on ethnology in the University of London. Among his published works are: *Evolution in Art* (1895); *Study of Man* (1897); *Head Hunters, Black, White, and Brown* (1901); *Magic and Fetishism* (1906); *The Races of Man and their Distribution* (1909); *History of Anthropology* (1910), with Quiggin; *The Wanderings of Peoples* (1912).

HADDON, Walter (1516–72). An English philologist, born in Buckinghamshire. He was invited to enter Cardinal College, Oxford, but preferred Cambridge, to which he had been elected from Eton. Together with Cheke, he labored for the reform of the ecclesiastical laws, and in 1571 the result of their work was published under the title *Reformatio Legum Ecclesi-*

asticarum. He was appointed master of Trinity Hall in 1551–52 and soon afterward succeeded Owen Oglethorp as president of Magdalen College, Oxford. This appointment, however, was at variance with the founder's statutes, and Queen Mary, soon after her accession to the throne in 1553, caused Oglethorp to be reinstated. His sympathies were with the cause of Protestantism, and in 1563, by direction of the government, he answered a letter published by a Portuguese priest named Jerome Osorio da Fonseca exhorting Queen Elizabeth to become a Roman Catholic. This was the beginning of a controversy which continued until his death. During his lifetime he enjoyed a great reputation as a writer of Latin prose; but later critics have not held his works in as much esteem as did his contemporaries. Consult the article of Thompson Cooper in the *Dictionary of National Biography*, vol. xxiii (London, 1890).

HAD'DONFIELD. A borough in Camden Co., N. J., 6 miles southeast of Camden, on the West Jersey and Seashore Railroad (Map: New Jersey, C 4). It contains the Shepherd's Home, Bancroft Training School, Hopkins Lake and Park, and a public library. The borough is a residential suburb of Philadelphia, has some farming interests, and a pottery. One of the water plants is owned by the municipality. Haddonfield adopted the commission form of government in 1913. Pop., 1900, 2776; 1910, 4142.

HADDON HALL. A fine specimen of the English baronial mansion, situated 2 miles southeast of Bakewell in Derbyshire, England. It was originally in the possession of the Avenel family, but in the twelfth century passed into the hands of the Vernons and, by the romantic marriage of Dorothy Vernon with Sir John Manners, became in the sixteenth century the seat of the Rutland line.

HA'DEN, Sir Francis Seymour (1818–1910). An English surgeon, one of the best etchers of the nineteenth century. He was born in London, Sept. 16, 1818, the son of a wealthy physician. He was educated at University College, London, and at the medical schools of the Sorbonne, Paris, where he took his degree, and Grenoble. He was highly successful in surgical practice, became a member of the Royal College of Surgeons of England in 1852 and a fellow in 1857 and distinguished himself by his studies in ovariotomy and by public-spirited enterprises, such as founding the hospital for incurables, London. He is, however, best known as an etcher and an authority on etching. While a student at the Sorbonne, he studied drawing at the night classes of the government school of art, as an aid to surgery, and while traveling in Italy he acquired the water-color technique from Duval le Camus, a French painter. He first etched in 1843, but did not take up etching as a life work until 1858, when his brother-in-law Whistler came to London. Thereafter he was rarely without a copperplate or sketching block to be used whenever the opportunity offered. The best known of his 251 plates are: "Thames Fisherman" (1859); the large "Shore Mill Pond" (1860); "Sunset in Ireland" (1863); "La belle Anglaise" (1864); "River in Ireland" (1868); "Breaking up of the Agamemnon" (1870), the most popular of all; "Calais Pier" (1874), after Turner; "Windsor" (1878). These are equaled and in many cases excelled by other works—by several, e.g., in the series *Etudes à l'eau-forte* (1865–66). His early figure pieces show the influence of Whistler, but his landscapes are highly individual. Thoroughly true to nature, they show complete mastery of line and virile technique and, at best, a true feeling for style. Sometimes, indeed, the unity of design is impaired by undue emphasis of disconnected detail. He was awarded the Grand Prix at Paris in 1889 and 1890, was a member of the Académie Nationale des Beaux-Arts and the Société des Artistes Français; a corresponding member of the Institute; and was knighted in 1894. Haden has done more perhaps than any other to promote etching in Great Britain. He was thoroughly schooled in the old masters of the art and the first to classify critically the work of Rembrandt in his *The Etched Work of Rembrandt Critically Considered* (1877) and other paintings. His publications include *About Etching* (London, 1878–79) and the *Art of the Painter-Etcher* (1890). He lectured widely in England and in 1882 in the United States. The last years of his life were spent in a delightful Elizabethan country seat at Woodcote (Hampshire), where he died June 1, 1910. His wife was a Miss Whistler, of Baltimore, sister of the famous painter, and his dissensions with his irascible but lovable brother-in-law were well known. Haden was also a draftsman and aquarellist of great ability. Most of his etchings are in the United States, the most important collections being those belonging to the New York Public Library, the Albright Art Gallery, Buffalo, and Harris B. Dick, New York. In 1910 the British Museum acquired a representative collection made by the artist himself.

Bibliography. The first catalogue of Haden's etchings was published, with the artist's coöperation, by Sir W. M. Richard Drake (London, 1880); the most complete by H. N. Harrington, under the title *The Engraved Work of Sir Francis Seymour Haden* (Liverpool, 1910). For an appreciation and biography, consult: Weitenkampf, *International Studio*, vol. xlii (New York, 1910); Hind, in *Die graphischen Künste*, vol. xxxiv (Vienna, 1911); articles by Keppel and Harrington, in Carrington, *Prints and their Makers* (New York, 1912).

HADERSLEBEN, hä'dĕrs-lā'ben. The capital of the district of the same name in the Prussian Province of Schleswig-Holstein, situated on the Hadersleben Fiord, 32 miles north of Flensburg (Map: Prussia, C 1). Its church of St. Mary, originally erected in the thirteenth century and rebuilt in the fifteenth, is a handsome edifice; the war monument, and the memorial to Kaiser Wilhelm I are noteworthy. The town has a gymnasium dating from the sixteenth century, a seminary for teachers, and one for clergymen. It manufactures machinery, chewing tobacco, and vehicles. Hadersleben obtained municipal rights in 1292. It suffered greatly from the wars between Schleswig and Holstein. Pop., 1900, 9201; 1910, 13,046.

HADES, hā'dēz (Gk. Ἅιδης, *Haidēs*, or Ἅδης, or Ἀΐδης, *Aidēs*, from ἀ, *a*, priv. + ἰδεῖν, *idein*, Lat. *videre*, Skt. *vid*, to see. Etymologically Hades is either the 'Unseen' or 'He that makes invisible'). 1. In Greek mythology, originally, as in Homer, the god of the lower world. (See Pluto.) In later writers the word is also used to denote the realm of Hades, called by the earlier poets "House of Hades" (*δόμος Ἅϊδος*). The Greek conceptions of this region varied greatly. In the common belief it was in the depths of the earth, while another view, seen, e.g., in the *Odyssey*, placed the home of the dead in the far west, the region of night and sunset. Entrances to the realm of Hades, when conceived of as in the earth, were set at various places, as at Cumæ (q.v.) in Italy, or on the promontory of Tænarum in Laconia. Wherever situated, it was a gloomy region, with its wide gates ever open to receive newcomers, but closely guarded by Cerberus (q.v.) against any who would return. Here also was the joyless asphodel meadow, where the shades wandered in sadness. Early also arose the belief in the rivers of the lower world, Styx, Acheron, Cocytus, and Pyriphlegethon, and the ferryman Charon (q.v.). Over against these views must be placed that of the abode of happiness for the favored (see ELYSIUM) and of punishment for the wicked. (See TARTARUS.) Consult: Rohde, *Psyche* (Freiburg, 1898); Farnell, *Cults of the Greek States*, vol. iii (Oxford, 1907); Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911). See GREEK RELIGION.

2. In the Septuagint and the Greek New Testament the word signifies the realm or abode of the dead. Other ancient peoples had corresponding terms. With the Egyptians the abode of the dead was Amentet (the west: see AMENTHES); the Babylonians called it Aralu (perhaps a cave); the Hebrews spoke of it as Sheol. The general idea among all these was the same—that of an undefined mysterious locality under the earth to which in some unexplained way the souls of the dead go, there to exist for all time to come. But as to details, no one of these ancient peoples possessed a generally accepted, consistently worked out theory. Besides the changes due to the progress of thought from age to age, in the same period many different conceptions were current, difficult if not impossible to combine into one consistent doctrine. This fact is well illustrated by the course of Hebrew and Christian thought on the subject.

The Hebrew word "Sheol," which the Greek version rendered by "Hades," comes, according to some scholars, from a root meaning 'hollow'; in this view "Sheol" meant the supposed great cavern or hollow under the earth where the dead abode. The term often indicates simply the grave. Another term similarly used in the Old Testament is *bor* (pit). The grave and Sheol proper are not, however, the same. The word "hell," so frequently used in the Authorized Version, originally meant much the same as "Sheol." Sheol was thought of as deep down (Deut. xxxii. 22; Ps. lxxxviii. 6, 11; Job xi. 8; Ps. lxxxvi. 13; Prov. xv. 11). The dead, though their bodies crumbled to dust in the graves, here continue a bodiless, shadowy sort of existence. They find themselves grouped according to earthly relationships, so that one who dies is "gathered to his fathers." They retain in some way their general appearance at the time of death (cf. the realistic narrative 1 Sam. xxviii. 8–14). They also may be possessed of unusual knowledge, if the gift of prognostication was theirs in life, so that there was a morbid curiosity to inquire of the dead through those who had "familiar spirits"—i.e., whom the "spirit" of the dead used as a medium of communication. Such conceptions were quite prevalent in early Israel; the Hebrews shared them with the old Semitic world about them. The state was a permanent one, looked upon as the normal consequence of a life lived out to its full length. To go to Sheol before one had filled out his days was a misfortune, a calamity; but not, apparently, because the condition there was supposed to be in itself unhappy, or affected by the time of one's death. A violent death, however, seemed to endanger one's peace in Sheol (cf. Num. xvi. 30, 33; 1 Kings ii. 6, 9; Ps. lv. 15). Yahwe was said to "save from Sheol" when He delivered from impending death (cf. Psalms, passim). In Sheol all were supposed to meet on a common level, good and bad alike (cf. 1 Sam. xxviii. 19). It was a gloomy, unattractive place. There was no escape from it; we read of the bars of Sheol (Job xvii. 16). It had its divisions; we hear of those who are assigned to its "uttermost parts" (Is. xiv. 15–19; Ezek. xxxii. 23). No vital connection with Yahwe belonged to the existence in Sheol. In it there was no remembrance of Yahwe, no praise, no work, no desire, only a negative existence (Ps. vi. 5, lxxxviii. 5–12; Eccl. ix. 5–10). As in Babylonia occasionally a hero in antiquity was conceived of as escaping from the nether world by being translated (see ENGIDU; GILGAMESH), so in Israel an Enoch (Gen. v. 24) or an Elijah (2 Kings, ii. 1, 11) was thought of as being taken up into heaven without having tasted death. In the Book of Job the idea is once suggested of a possible return from Sheol because of God's longing for the work of His hands (xiv. 14), but it is resolutely brushed aside, since the author does not believe that, if a man dies, he can live again. Through the influence of Persian thought, however, the conception of a resurrection becomes familiar and meets us in Dan. xii. 2; Isa. xxvi. 19, and then in the apocryphal literature. (See APOCRYPHA; RESURRECTION.) Hades came to be thought of as definitely divided into two main parts, each capable of subdivision—one the place of the righteous dead, the other that of the wicked. From the abode of the righteous a resurrection to a new blessed life was thought possible or probable; the wicked were doomed to stay in their already unhappy abode or to meet with a further punishment in Gehenna, i.e., the place of fiery torment. In close connection with Gehenna was the great Abyss, in which the evil angelic spirits met their due reward. In such developments the influence of Greek mythology is perceptible. But Ecclesiasticus, the Psalms, Ecclesiastes, and the notices concerning the Sadducees show how strongly intrenched the older views were, and how slowly they gave way to the foreign conceptions.

The New Testament writings reflect the later ideas and use them to illustrate their teachings. Hence we find Jesus, in the parable in Luke xvi. 19–31, speaking of Hades, where the rich man was tormented, and of "Abraham's bosom," where Lazarus is comforted. He is represented as referring to the "everlasting fire" prepared for the devil and his angels and for wicked men (Matt. xxv. 41), and to "Paradise," where the repentant thief would be with Him after death (Luke xxiii. 43). But such statements do not contain definite doctrine. The same may be said of other New Testament references to the post-mortem condition of the soul, such, e.g., as are found in Rev. i. 18; vi. 8; etc. The bulk of the positive teaching of the New Testament has reference to the resurrection and its implication—the positive and blessed fellowship of repentant souls with their Heavenly Father. In later thought the modified Hades conception survived in the idea of a purgatory, the abode between death and the final judgment of those who were not hopelessly lost and yet not ready for entrance into heaven. Consult: Salmond, *Christian Doctrine of Immortality* (3d ed., Edinburgh, 1897); Alger, *A Critical History of the Doctrine of a Future Life* (New York, 1871); Charles, *Critical History of the Doctrine of Future Life* (London, 1897); Carlo Pascal, *Le credenze d' oltretomba nelle opere letterarie dell' antichità classica* (Catania, 1912). See Abaddon; Abyss; Eschatology; Gehenna; Hell; Immortality; Purgatory.

HAD′FIELD, Sir Robert A. (1859–). An English metallurgist. A great iron and steel manufacturer, with works at Sheffield, he owed much of his success to his discovery in 1883 of gamma nonmagnetic manganese steel, the first alloy to be both ductile and hard. He received medals and awards from England, France, and the United States, notably the Bessemer gold medal for 1904 from the Iron and Steel Institute, the Elliott-Cresson gold medal of the Franklin Institute, Philadelphia, and medals of the Société d'Encouragement pour l'Industrie Nationale.

HADIK VON FUTAK, hä′dĭk fȯn fo͞o′tȧk, Andreas, Count (1710–90). An Austrian general, born on the island of Schütt (formed by the Danube, between Pressburg and Komorn), of an ancient noble family of Hungary. He distinguished himself in the wars against France and Prussia by his bravery and strategical skill. He was advanced to the rank of general in 1747. In the second year of the Seven Years' War he was decorated with the cross of the Maria Theresa Order and raised to the nobility. After the treaty of peace (1763) he became Governor of Transylvania. He was commander in chief of the Austrian army during the Turkish campaign of 1789, but was compelled by illness to resign his command to Laudon. His diary contains much interesting information on the military history of the eighteenth century. In 1888 an Austrian regiment was named after him.

HADING, ȧ′dăɴ′, Jane (1859–). The stage name of Jeanne-Alfrédine Tréfouret, a French actress, born at Marseilles. Her first appearance on the stage, she has recorded, was when she was three years old. At the age of 14, after dramatic studies at the Conservatoire of her native city, she began her career in Algiers and Cairo. She first appeared in Paris in 1879, when she sang in *La petite mariée* and *La belle Lurette*. She was engaged in 1885 at the Gymnase, under the direction of M. Victor Koning, whom she afterward married (1884) and divorced (1887). She established her popularity by her enormous success in Ohnet's *Le maître de forges;* in *Frou Frou* (1886) she added still further to her reputation. She contributed to the success of M. Lavedan's *Prince d'Auree* in June, 1892, and afterward joined the Comédie Française. Sardou chose her for the title rôle of his *Marcelle* in 1896. She appeared in many parts of Europe and in South America, as well as in the United States, where she became best known by her tours with Coquelin in 1888 and 1894.

HAD′ITH (Ar. *hadith*, tradition, from *hadatha*, to occur). The general designation in Arabic for a story or tradition, but more specifically applied to the traditions about Mohammed, the prophet's sayings and doings, which, as a complement to the Koran, form, together with it, the supreme authority for all religious and legal questions of the Mohammedans. Originally the traditions were transmitted orally; but the danger of their being entirely forgotten gradually led to their being written down in the first centuries after Mohammed. The earlier collections, however, possess only individual authority and make no claim to systematic arrangement or comprehensiveness. Such collections are known as *musnads* (genealogical chains), from the fact that each tradition is traced back to its ultimate authoritative source. Eight of such musnad collections are known to us, though many more were produced. The higher class of Hadith literature, however, is represented by collections termed *musannat* (systematized), in which the traditions are divided according to subjects and treated with reference to their ritualistic, historical, and ethical import. The attempt is made to carry each utterance of the prophet back from one source to another, until a contemporary of Mohammed is reached, and if the chain is complete the tradition is considered to be of the first class; the value of the defective traditions varies again according to the number of links missing, and the names of those who have transmitted the traditions. It will be seen that in this way the door is opened for almost endless variety of opinions as to the exact value of this or that tradition. The principal and most authoritative collections of traditions are those of Bukhari, Muslim, Abu Da'ud, Tirmidhi, Nasa'i, and Ibn Maja. Of these again, which were all produced in the ninth century, the most important code is the *Sahih* of Bukhari (810–870), who, it is said, spent 16 years of his life in traveling through the length and breadth of the land for the purpose of collecting such traditions, and who singled out, from a number of 60,000, about 7270 as alone genuine. Besides numerous editions published within the last 50 years in the Orient, a standard European edition of the *Sahih* was published by Krehl, *Le recueil des traditions musulmanes, par . . . al-Bokhari* (Leyden, 1862–68). Every generation, almost, produced collections of traditions aiming to fill out gaps or to determine the value of traditions. The enormous Hadith literature was discussed critically and at length by Goldziher, in his *Mohammedanische Studien*, vol. ii (Halle, 1890). Buhl (in *Orientalische Studien Theodor Nöldeke gewidmet*, Giessen, 1906) employed the same method in sifting the testimony concerning the battle of Badr and the Abyssinian hegira. Recently a most searching criticism of the Hadith has been made by Henri Lammens, his principal publications being: "Qoran et Tradition, comment fut composée la vie de Mahomet," in *Recherches de Science Religieuse*, vol. i (Paris, 1910); *Fatima et les filles de Mahomet, notes critiques pour l'étude de la Sira* (Rome, 1912); and *Le berceau de l'Islam*, vol. i (ib., 1914). Lammens maintains that the *Sira*, or the biography of the prophet, such as is found in Ibn Ishak and others, has no independent value as an historical source, but is drawn from the *Tafsir*, or interpretation of the Koran, and the *Hadith;* that the exegetical and dogmatic interest was older than the historical; that the vast *Hadith* material consists of either exegetical developments of hints in the Koran or inventions of a dogmatic and juridical nature, and that little reliance can be placed on it. Becker, in *Archiv für Religionswissenschaft*, vol. xv (Leipzig, 1912), and in "Principielles zu Lammens Sirastudien," in *Der Islam*, vol. iv (Strassburg, 1913), has pointed out that the skepticism of Lammens, though great, does not go far enough, as it leaves him with a somewhat naïve faith in all the bad stories told about Mohammed, Fatima, Ali, and the home life of the prophet, even where motives and tendencies explaining them are quite obvious. Nöldeke has also protested against this excessive skepticism, "Die Tradition über das Leben Muhammeds," in *Der Islam*, vol. v (Strassburg, 1914). See SUNNA; MOHAMMEDANISM; KORAN.

HADJEMIS, hăj′ē-mĭz. A name applied to the Iranian population of that part of Persia between Ispahan and Teheran, including also the Talych and Mazanderani of the shores of the Caspian. See PERSIA, *Ethnology.*

HAD′LEY. A town, including several villages, in Hampshire Co., Mass., 3 miles northeast of Northampton, on the Connecticut River and on the Boston and Maine Railroad (Map: Massachusetts, B 3). It is in an agricultural region and has two public libraries. There are manufactories of brooms and broom tools. The government is administered by town meetings. Pop., 1900, 1789; 1910, 1999. Settled as Norwottock in 1659, Hadley was incorporated under its present name (from Hadley, England) in 1661. The regicides Goffe and Whalley were concealed here for some years after 1664; and there is a tradition that in 1675 the former suddenly appeared, put himself at the head of the people, and saved the town from an Indian attack. Consult Judd, *History of Hadley* (new ed., Northampton, 1905).

HADLEY, ARTHUR TWINING (1856–). An American educator and economist. He was born at New Haven, Conn., the son of Prof. James Hadley. Graduating from Yale in 1876, he afterward studied political science there (1876–77) and at the University of Berlin (1878–79), receiving the degree of Ph.D. from the latter institution. He was tutor in Yale College (1879–83), university lecturer on railroad transportation (1883–86), commissioner of labor statistics for Connecticut (1885–87), professor of political science at Yale (1886–98), and president of Yale after 1899. In 1906 he was appointed Roosevelt professor in the University of Berlin for 1907–08. He was president of the American Economic Association in 1897–99 and was elected a member of the American Academy of Arts and Letters. The publication, in 1885, of his *Railroad Transportation: Its History and its Laws*, at once gained him the position of an authority on the subject; in the same year he was summoned as expert witness before the Cullom Senate Committee, which drafted the Interstate Commerce Law. He prepared the *Connecticut Labor Reports, Report on the Labor Question* (1885), and *Report on the System of Weekly Payments* (1886); and wrote: *Economics* (1896); *Education of the American Citizen* (1901); *The Relations between Freedom and Responsibility in the Evolution of Democratic Government* (1903); *Baccalaureate Addresses* (1907); *Standards of Political Morality* (1907); *Some Influences in Modern Philosophic Thought* (1913). He contributed numerous essays on political and economic subjects to scientific and popular periodicals, and is the author of the articles on transportation in Lalor's *Cyclopædia of Political Science.*

HADLEY, HENRY K. (1871–). An American composer, born at Somerville, Mass. In Boston he studied with George W. Chadwick and Stephen A. Emery, but subsequently completed his musical education in Vienna. Upon his return to America in 1895 he was appointed instructor of music at St. Paul's School, Garden City, Long Island. In 1911 he became conductor of the San Francisco Symphony Orchestra. He wrote four symphonies, of which the second won the Paderewski prize in 1901; two symphonic poems, *Lucifer* and *Salome;* orchestral suites, vocal pieces for solo and chorus, instrumental trios, quartets, etc., over 150 songs, three concert overtures, and two comic operas.

HADLEY, HERBERT SPENCER (1872–). An American lawyer and politician, born at Olathe, Kans. He graduated at the University of Kansas in 1892, studied law at Northwestern University, and in 1894 began to practice in Kansas City, Mo. He was elected prosecuting attorney for Jackson Co., Mo., in 1901, and in 1904 Attorney-General of that State. In 1906 he became widely known through his successful attack on the Standard Oil Company, when he forced prominent officials of the corporation to take the stand. He followed this by attacks on other large trusts. Through his efforts a two-cent-per-mile passenger fare was secured. From 1909 to 1912 he was Republican Governor of Missouri. He was a member of the committee of governors who invited Theodore Roosevelt to run for President in 1912 and acted as floor leader for the Roosevelt forces in the Republican National Convention. He published in 1907 *Railroad Rate Regulation.*

HADLEY, JAMES (1821–72). An American scholar, born at Fairfield, N. Y. An accident in boyhood made him hopelessly lame and deprived him of all hope of an active life. He graduated from Yale College, first in his class, in 1842, and in 1844 he was made tutor in Middlebury College. In 1845 he was appointed tutor at Yale and in 1848 became assistant professor of Greek. In 1851 he was elected professor to succeed Dr. Woolsey and continued to hold this office until his death. Although he had taken a theological course at New Haven immediately after graduation, Professor Hadley devoted himself to the study of languages. In addition to Greek, he was familiar with Sanskrit, Hebrew, Arabic, Latin, Gothic, Armenian, Gaelic, Swedish, Early English, and the principal modern languages. He was the author of *The History of the English Language* in the introduction to the earlier editions of Webster's Dictionary. He published a *Greek Grammar* (1860), based on that of Curtius' *Schulgrammatik*, which, as revised by Prof. F. D. Allen, of Harvard University (1884), has maintained a place with that of Goodwin as a standard reference book in American schools and colleges. An *Essay on the Greek Accent* was republished in Curtius, *Studien zur griechischen und lateinischen Grammatik.* Ex-President Woolsey edited a posthumous volume of Hadley's lectures on *Roman Law* in 1873, and in the same year Prof. W. D. Whitney edited a second volume of 20 *Essays, Philological and Critical.* Consult Porter, *The New Englander*, vol. xxxii (New Haven, 1873), and A. T. Hadley, *Biographical Memoirs of the National Academy of Sciences*, vol. v (Washington, 1905).

HADLEY, JOHN (1682–1744). An English mathematician and physicist. He became a fellow of the Royal Society in 1717, a member of its council in 1726, and its vice president in

1728. It is by his improvements in the reflecting telescope (1719–20) that he is best known. By means of the improved instrument Hadley and his friend Bradley made important discoveries relative to the satellites of Jupiter and Saturn. He also suggested (1730) a valuable improvement to the quadrant. See GODFREY, THOMAS.

HADOW, hăd′ō, WILLIAM HENRY (1859–). An English musical scholar and composer, born at Ebrington (Gloucestershire). After the completion of his general education at Oxford he went in 1882 to Darmstadt to study music. He returned two years later and continued the practical study of music with C. H. Lloyd in Oxford. From 1890 to 1899 he lectured at the University on the history of music. He published two volumes of *Studies in Modern Music* (1892, 1894), a *Primer of Sonata Form* (1896), and *A Croatian Composer* (1897). He is the editor of the scholarly "Oxford History of Music" (1901–06), of which he wrote the fifth volume, *The Viennese Period* (1904). As a composer, he cultivated the field of chamber music with predilection and success.

HADRACH, hā′drăk *or* hăd′răk. In Zech. ix. 1 "the land of Haddrach" is mentioned with Damascus and Hamath. The city of Hadrach is probably identical with Hazrak, referred to several times in the inscription of Zakir, King of Hamath and La'ash (c.800 B.C.). It appears to have been delivered by Zakir from the power of Bar Hadad II of Damascus. Asurdan III (775–755 B.C.) attacked it on three of his expeditions, and Tiglath-pileser IV (745–728 B.C.) mentions it in connection with his war upon Azriyau of Ya'di in 738 B.C. Rabbi Jose, in the second century A.D., speaks of it as near Damascus; Cyril of Alexandria, as between Epiphania (Hamath) and Damascus; and the Karaite lexicographer, David ben Abraham, in the tenth century, as near Damascus. It has not been clearly identified with any modern locality. Consult: Delitzsch, *Wo lag das Paradies?* (Leipzig, 1881); Neubauer, *La géographie du Talmud* (Paris, 1868); Pognon, *Inscriptions sémitiques de la Syrie, de la Mésopotamie, et de la région de Mossoul* (ib., 1907).

HADRAMAUT, hä′drȧ-mạt′. A region of south Arabia, along the Gulf of Aden, between Mahra on the east and Yemen on the west (Map: Turkey in Asia, F 8). Its area is about 100,000 square miles. Along part of the coast is a narrow coastal plain which rises in terraces to the mountainous border of a table-land 30 miles inland. This strip of mountains attains 8000 feet. The table-land behind slopes to the north and finally disappears in the great desert of the interior. Hadramaut is mostly barren. In its valleys, of which the Wadi Doan is the best known, the vegetation is often very luxuriant, and a number of important communities are found. The population is estimated at 500,000 and includes a race of Bedouins. The chief towns are Keshin, Terim, and Shibam, in the interior, and Makalla, a considerable port. A part of the country is under the protection of England.

HADRIA. See ATRI.

HA′DRIAN (PUBLIUS ÆLIUS HADRIANUS) (76–138). A Roman Emperor (117–138 A.D.). He was born, according to some authorities, in Rome, according to others in Italica in Hispania Bætica. Under Nerva and even more during the reign of Trajan, who was his guardian, and with whom he was connected by marriage, he filled high offices in the state. He accompanied the Emperor in his wars against Decebalus (q.v.), where he distinguished himself by his bravery; and in 117, when Trajan set out on his return to Italy from the East, he was left behind as commander of the army and as governor of the Province of Syria. When the intelligence reached Antioch that Trajan had died in Cilicia on his journey home, Hadrian was proclaimed Emperor by the army (Aug. 11, 117 A.D.) and by the Senate. The state of the Empire at the time was extremely critical. Insurrections had broken out in Egypt, Palestine, and Syria; Mœsia in the east and Mauritania in the west were both invaded by barbarian hordes, while the Parthians had once more defied the Roman power and had won several successes over the Imperial forces. Hadrian, perceiving the advantage of a peaceful policy, wisely resolved to limit the boundaries of the Roman dominion in the East and concluded a peace with the Parthians, surrendering to them all the country beyond the Euphrates. A conspiracy against his life was repressed by the Senate. In 118 Hadrian returned to Rome and established his authority by liberality towards the people, in shows of various kinds and by liberal support of poor children, and by his considerate attitude towards the Senate. The Roxolani, who had made an inroad into Mœsia, were by large gifts induced to retire. In 119 he set out on his long travels, visiting Gaul, Germany, Britain (where he built the famous wall extending from the Solway to the Tyne), Spain, Mauritania, Egypt, Asia Minor, and Greece. He returned to Rome 126 or 127 A.D., and received the title of *pater patriæ*, after which he resumed his travels through the Empire. He spent the years 132 and 133 in Athens, for which city he had a great predilection. At this time occurred the great rising of the Jews under Bar-Cochba. After once more visiting Syria Hadrian returned to Italy and spent the last years of his life at Rome and Tibur (Tivoli). During the severe illness which caused his death, July 10, 138, at Baiæ, he was subject to violent outbursts of cruelty, to which, as well as to jealousy and pleasure, he was naturally addicted. After the death of Lucius Ceionius Commodus, whom he had adopted under the name of Lucius Ælius Verus, he appointed Titus Aurelius (afterward the Emperor Antoninus Pius) his successor. During his reign the army was vigorously disciplined and reorganized, while as a civil ruler he merits high praise for the just and comprehensive view he appears to have taken of his duties as a sovereign and for the many reforms he instituted in governmental matters, not only in Rome, but in the districts through which he traveled. To him is attributed, more than to any other, the consolidation of the monarchical system of Rome. Hadrian divided Italy into four districts, in charge of men of consular rank, to whom he intrusted the administration of justice. He erected numerous splendid edifices, the chief of which were, in Rome, the temple of Venus and Rome, the mausoleum called the *Moles Hadriani* (now called Castel Sant' Angelo), the Ælian Bridge leading to it, and the magnificent villa at Tibur. At Athens (q.v.) he completed and dedicated the famous temple of Zeus, the Olympieum. (See also HADRIAN, ARCH OF.) He likewise laid the foundations of several cities, the most important of which was

Hadrianopolis (Adrianople). Hadrian was a lover of fine arts, of poetry, philosophy, and rhetoric. Consult: Merivale, *History of the Romans under the Empire* (8 vols., New York, 1890); Schurz, *De Mutationibus in Imperio Ordinando ab Imperatore Hadriano Factis* (Bonn, 1883); Lanciani, *Ancient Rome in the Light of Recent Discoveries* (Boston, 1889); Plew, *Quellenuntersuchungen zur Geschichte des Kaisers Hadrians* (Strassburg, 1890); Bury, *The Students' Roman Empire* (New York, 1893); Gregorovius, *The Emperor Hadrian* (Eng. trans., London, 1898); Schultess, *Bauten des Kaisers Hadrian* (Hamburg, 1898); Kornemann, *Kaiser Hadrian und der letzte grosse Historiker von Rom* (Leipzig, 1905); Weber, *Untersuchungen zur Geschichte des Kaisers Hadrianus* (ib., 1908); Spartianus, *The Life of the Emperor Hadrian* (New York, 1908). For Hadrian's writings, consult Teuffel, *Geschichte der römischen Litteratur* (6th ed., Leipzig, 1913).

HADRIAN, Arch of. A well-preserved triumphal arch at Athens, southeast of the Acropolis. It was built of Pentelic marble, by Hadrian, and divided the ancient city of Theseus from Hadrianopolis, the new city of Hadrian. The arch is 59 feet in height and 44 in width, with a single archway 20 feet wide, surmounted by an attic with three openings. The arch may be on the site of a gate in the earlier wall, leading out to the Olympieum and the fountain Callirrhoë. The inscriptions fronting the new and the old city are still in place. The arch is figured in E. A. Gardner, *Ancient Athens* (New York, 1902), and in Weller, *Athens and its Monuments* (ib., 1913).

HADRIAN, Tomb or Mausoleum of (Lat. *Hadrianum* or *Moles Hadriani*). The massive building in Rome now known as the Castel Sant' Angelo. It was erected in 136 A.D. by the Emperor Hadrian, together with the Ælian Bridge (Ponte Sant' Angelo), which gave access to it. The tomb was situated in the gardens of Domitia, on the bank of the Tiber. It consisted of a basement about 247 feet square and about 35 feet high, surmounted by a circular mass of masonry about 210 feet in diameter and 70 feet high. The whole was built of concrete with travertine walls and was faced with Parian marble. The form of the structure above the circular mass cannot be certainly determined. The tomb was adorned with statues and surrounded by a gilt bronze railing with gilt peacocks, two of which are preserved in the Vatican gardens. The front of the basement had panels bearing the names of the members of the Imperial family buried in the tomb. The entrance to the burial chambers was in the front, facing the bridge. The structure was fortified in the time of Honorius and was the centre of the factional strife during the mediæval and modern history of Rome. The castle was held by the popes from the time of Boniface IX and about 1500 was connected with the Vatican by a subterranean passage. The ancient structure is almost concealed by the works of fortification which have been added to it and has been despoiled at various times. The marble tombstones were used by Gregory XIII in the construction of his Gregorian Chapel in the Vatican, and the mausoleum supplied the materials with which the Sistine Chapel was built. The gilt angel sheathing his sword, and with outstretched wings, on the pinnacle of the structure, is a modern work, taking the place of previous statues destroyed or stolen during the Middle Ages. It commemorates the appearance of the Archangel Michael to Gregory the Great during a plague (509); the Archangel was seen, it is said, sheathing his sword, as sign that the plague was to end. Consult Baedeker, *Central Italy and Rome* (15th Eng. ed., Leipzig, 1909), and Platner, *The Topography and Monuments of Ancient Rome* (2d ed., New York, 1911).

HADRIAN'S VILLA. A magnificent country place laid out and built by the Emperor Hadrian near Tibur (Tivoli). It covered an area of several square miles, and its different parts bore the names of famous scenes and buildings which Hadrian had visited in his travels. It contained gardens, theatres, a stadium, apartments, baths, colonnades, terraces, and many artificial landscape features, carried out with lavish use of costly materials, which were subsequently used in the construction of other buildings. The ruins, in great part preserved, have for centuries yielded important works of ancient art, now in the various museums of Rome. Consult: Gusman, *Hadrien et la villa imperiale di Tibur* (Paris, 1904); Baedeker, *Central Italy and Rome* (15th Eng. ed., Leipzig, 1909); Lanciani, *Wanderings in the Roman Campagna* (Boston, 1909).

HADRIAN'S WALL. See Roman Wall.

HADROME, hăd′rōm (from Gk. *ἁδρός*, *hadros*, thick). The water-conducting portion of a vascular bundle. It includes the vessels, tracheids, and wood parenchyma, but not the fibrous cells. Where the fibrous cells are lacking altogether, as is generally the case in monocotyledons, the hadrome and xylem are identical. See Leptome; Mestome.

HAD′ROSAU′RUS (Neo-Lat., from Gk. *ἁδρός*, *hadros*, thick + *σαῦρος*, *sauros*, lizard). A gigantic fossil lizard of the dinosaur group, found in the Cretaceous sandstones of Wyoming. The shape of the animal was very peculiar. With a length of 35 feet, it had a small head, short feebly built forelegs and strong hind limbs, and heavy tail. Its jaws were broadened laterally to form a flattened bill like that of a duck. Portions of thick rhinoceros-like hide were found associated with the skeleton. The animal is considered to have been an amphibian, feeding on succulent marsh plants, for which habit its flattened beak seems to have been peculiarly adapted. See Dinosauria.

HAD′RUME′TUM (Lat., from Gk. *Ἁδρούμητος*, *Hadroumētos*, or *Ἁδρούμητον*, *Hadroumēton*). An ancient city on the African coast of the Mediterranean on the Gulf of Hammamet (Tunis), long a prosperous agricultural and trading centre. A Phœnician colony which claimed to be of much earlier date than Carthage, in course of time it became subservient to Carthage and fell along with it under the power of the Romans. On the subdivision of the Roman Province of Africa Propria, it became the capital of Byzacium, or Africa Byzacena. By Trajan it was made a colony—*Colonia Concordia Ulpia Traiana Augusta Frugifera Hadrumetina*. From the devastation inflicted by the Vandals, in 434, it was restored by Justinian, and in consequence it bore for some time the name of Justinianopolis. Its site is occupied in part by the city now called Susa (q.v.). Since 1863 excavations by the French have revealed extensive remains of both the Punic and the Roman towns. Consult: Cagnat, *Explorations archéologique en Tunisie* (Paris, 1885); *Revue Archéologique* (ib., 1884; 1897); *Bulletin de la*

Société Archéologique de Sousse (Sousse, 1903–); *Atlas archéologique de Tunisie* (Paris, 1893–99)—the fourth part gives a plan of Hadrumetum.

HAECKEL, hĕk′l, Ernst (1834–). A German zoölogist and natural philosopher, born at Potsdam. He studied medicine and the natural sciences at Berlin, under Johannes Müller, and at Jena. After taking his medical degree at Berlin, he practiced medicine for a year, and then, having decided to devote himself to the natural sciences, he studied marine life in Heligoland, Messina, and Naples. In 1861 he became privatdocent, in 1862 professor extraordinarius, and in 1865 professor of zoölogy at Jena. He made numerous scientific journeys—to the Canary Islands, to Norway, the Adriatic, the Red Sea, Corsica, Sardinia, Ceylon, and Java. He published: *Die Radiolarien* (1862); *Die Hydromedusen* (1865); *Entwicklungsgeschichte der Siphonophoren* (1869); *Moneren und andere Protisten* (1870); *Die Kalkschwämme* (1872). The last-named work is an important monograph upon calcareous sponges, in which an attempt is made to arrange them in a natural system; the proposition being that the layers forming the body wall are also homologized with the ectoderm and endoderm of the gastrula. This is the basis laid for the celebrated gastræa theory. Other investigations are: *Arabische Korallen* (1876); *Das System der Medusen* (1880–81); *Reports on the Radiolaria, on the Deep Sea Medusæ, on the Deep Sea Keratosa, on the Siphonophora Collected by the Challenger* (1882–88); *Plankton-Studien* (1890). Haeckel's philosophical writings were first inspired by Darwin's *Origin of Species.* In 1866 appeared *Die generelle Morphologie der Organismen,* which was the first attempt to apply the general doctrine of development to the whole field of morphology, and also to found a classification of animals and plants based upon the doctrine of their common relationship. In it he formulates the celebrated "biogenetic" law, already stated by Von Baer, Agassiz, and Fritz Müller. In 1868 appeared *Natürliche Schöpfungsgeschichte,* translated into English as the *History of Creation,* which is a popular exposition of the doctrine of evolution and has had the widest circulation and done more to popularize Darwinism in Germany than any other book. *Ueber die Entstehung und den Stammbaum des Menschengeschlechtes* (1870) and *Anthropogenie* (1874) treat specially of the descent of man. In *Die Gastræatheorie* (1874) he traces the phyletic history of all the great groups of the animal kingdom and finds for all of them a common ancestor in the hypothetical gastræa. (See Gastræa Theory.) Haeckel's influence upon contemporaneous thought has been very great. As a popular scientific writer and lecturer, he has spread the knowledge of the principles of Darwinism throughout Germany and Europe, while his speculations on the phyletic history and ancestry of the various groups of animals, and his attempts to classify them so as to express their relationships and common descent, although often erroneous, have stimulated investigation and led the way to the correct interpretation of phenomena. He is one of the best-known exponents of the monistic philosophy, which he has advocated in most of his speculative writings. His most important contribution to it is *Die Welträtsel. Gemeinverständliche Studien über monistische Philosophie* (4th ed., 1900; Eng. trans., *The Riddle of the Universe,* 1902). *Die systematische Phylogenie* (1894) is the last of his contributions to general evolution. Among books of travel Haeckel wrote *Indische Reisebriefe* (1882) and *Aus Insulinde,* the latter having first appeared in 1883, and later in an English translation entitled *A Visit to Ceylon.* More popular, beautifully illustrated works are *Kunstformen der Natur* (1904) and *Wanderbilder* (1905). His latest contributions to evolution and especially with reference to man are *Anthropogenie* (5th ed., 1903); *Ueber unsere gegenwärtige Kenntniss vom Ursprung der Menschen* (1898), the English edition *The Last Link* appearing in the same year; *Der Kampf um den Entwickelungsgedanken* (1905), with the English version called *Last Words on Evolution* (1906). In 1904 appeared a supplement to the *Riddle of the Universe* entitled *Die Lebenswunder.* Consult O. J. Lodge, *Life and Matter: A Criticism of Haeckel's Riddle of the Universe* (New York, 1905), and W. Bölsche, *Haeckel: His Life and Work* (London, 1906).

HÆDUI. See Ædui.

HÆMAMŒ′BA LAVERA′NI. See Sporozoa.

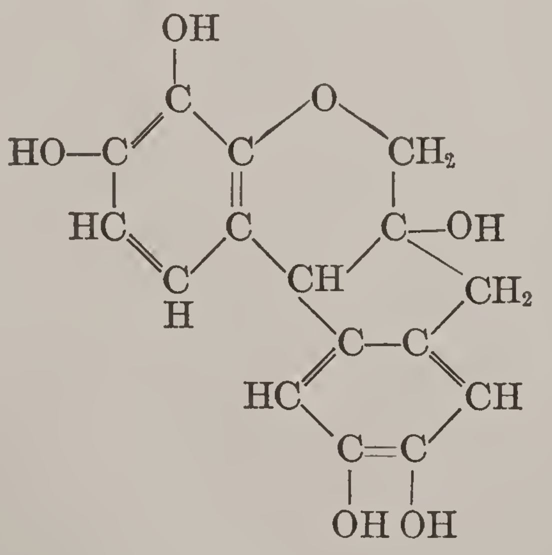
HÆMANTHUS, hē-măn′thŭs. See Blood-flower.

HÆMATEMESIS, hĕm′ȧ-tĕm′ē-sĭs (Neo-Lat., from Gk. αἷμα, *haima,* blood + ἔμεσις, *emesis,* vomiting, from ἐμεῖν, *emein,* to vomit). Vomiting of blood. A symptom of ulcer or cancer of the stomach or of the œsophagus, hemorrhage from the lining of the stomach (as in alcoholism, poisoning, yellow fever, or purpura hæmorrhagica), or cirrhosis of the liver. The blood may be fresh or clotted, or mixed with ingesta or with mucus. The treatment of this symptom is rest on the back, small pieces of ice swallowed, and absolute avoidance of solid and sometimes even liquid food, and of alcoholic drinks. It is a symptom of so much importance and gravity that medical aid should be at once obtained.

HÆMATIN, hĕm′ȧ-tĭn (from Gk. αἷμα, *haima,* blood), $C_{34}H_{35}N_4FeO_5$, or, according to some chemists, $C_{32}H_{32}N_4FeO_4$. A bluish-black substance obtained, together with a proteid, when the oxyhæmoglobin of blood is treated with acids or alkalies or is acted on by the gastric or pancreatic juice. It is chemically very stable, the caustic alkalies, hydrochloric and nitric acids, having no effect on it, and it does not decompose even at as high a temperature as 180° C. It is insoluble in water and in the ordinary organic solvents, but dissolves readily in alkaline solutions. By the action of sulphuric acid it is transformed into hæmatoporphyrin, a substance that contains no iron and has also been obtained by decomposing chlorophyll (q.v.), the green coloring matter of plants. Pure hæmatin may be prepared from hæmin by boiling with acetic acid, washing with water, alcohol, and ether, dissolving in dilute potash, and precipitating with hydrochloric acid; the hæmatin thus precipitated is carefully washed with hot water and dried at 130°–150° C. Hæmatin may also be obtained directly from blood, the following being a convenient method of preparation: defibrinated blood is mixed to a thin paste with potassium carbonate, the paste is evaporated to dryness on a water bath, and the residue is extracted with boiling alcohol; the solution thus obtained is made acid by carefully adding sulphuric acid, is filtered, again made alkaline by adding an excess of ammonia, and then evaporated to dryness; on washing the residue with boiling water and drying at 130°–150° C., a fairly good specimen of hæmatin is obtained.

HÆMATOCELE, hĕm′ȧ-tō-sēl (from Gk. *αἷμα, haima*, blood + *κήλη, kēlē*, tumor). A tumor containing blood.

HÆMATOXYLIN, hĕm′ȧ-tŏks′ĭ-lĭn (from Gk. *αἷμα, haima*, blood + *ξύλον, xylon*, wood). A chromogen (a term used by chemists to denote certain nearly or quite colorless substances which under certain influences yield well-marked colors) obtained by extracting logwood (*Hæmatoxylon campeachianum*) with ether. Hæmatoxylin is best prepared by finely powdering the crusts that separate out of a strong logwood extract on standing, and treating the powder with ordinary ether; the resulting ethereal solution is evaporated to dryness, and water poured over the residue, hæmatoxylin then gradually separating out in crystalline form; these crystals may be purified and completely decolorized by recrystallizing them from water to which a small amount of acid sodium sulphite has been added. The composition of hæmatoxylin is represented by the formula $C_{16}H_{14}O_6 3H_2O$, and in its pure state it occurs in transparent glistening colorless prisms. It has a sweet and nonastringent taste, is sparingly soluble in cold water, but dissolves readily in boiling water, alcohol, and ether. The aqueous solution is not affected by the air, but if a very small quantity of ammonia is added, it assumes an intense reddish-purple color. This color is due to a decomposition, of which a substance $C_{16}H_{12}O_6$, termed *hæmatein*, is one of the products. The compound resulting from the union of hæmatein and ammonia is represented by the formula $C_{16}H_{12}O_6 2NH_3$. Hæmatoxylin is used in the arts for producing blue and black colors. The commercial *hæmien* is an impure form of hæmatoxylin. Logwood (q.v.) contains about 12 per cent of hæmatoxylin. The chemical constitution of hæmatoxylin was established by W. H. Perkin about 1908. The formula which Perkin found to represent correctly the molecular structure of the substance had already been proposed by Pfeiffer in 1904 and is as follows:



HÆM′ATOZO′A. See Sporozoa.

HÆM′ATU′RIA (Neo-Lat., from Gk. *αἷμα, haima*, blood + *οὖρον, ouron*, urine). The appearance of blood in the urine. It is a symptom of disease of the kidneys, bladder, or prostate gland (tumor, stone, tubercle, syphilis, hypertrophy, etc.) in most cases. The treatment depends upon the condition present. Rest is important. The presence of blood may be recognized in the urine by the color, which is red or smoky, depending on the quantity and the time it has been mixed with the urine; by means of the spectroscope, which shows a dark band between D and E; by the use of the microscope, which reveals the presence of blood corpuscles in the urine; and by certain chemical tests.

Hæmoglobinuria is a condition in which the hæmoglobin of the blood is set free and is excreted in the urine. It occurs in yellow fever, scarlatina, diphtheria, malaria, scurvy, and purpura; it may follow transfusion or severe burns; and certain drugs or chemicals, e.g., chlorate of potassium, carbolic acid, and sulphureted hydrogen, may produce the phenomenon. See Red Water.

HÆ′MODY′NAMOM′ETER (from Gk. *αἷμα, haima*, blood + *δύναμις, dynamis*, power + *μέτρον, metron*, measure). An instrument for determining the pressure of the blood in the arteries and veins of the living body. The pressure of the blood is measured, as in the barometer, by the column of mercury that it balances. The instrument has been improved in various ways, and a contrivance added by which the oscillations of the mercury are inscribed in the form of an undulating curve on a cylinder made to revolve by clockwork. Recently instruments have been introduced by means of which the blood pressure can be determined in the human subject with facility and precision; these are of great clinical value. See Sphygmograph.

HÆ′MOGLO′BIN (from Gk. *αἷμα, haima*, blood + Lat. *globus*, ball). An important substance found in red blood corpuscles, and having the property of readily taking up oxygen from the air and just as readily giving it up to the tissues of the body. The chemical nature of hæmoglobin is as yet little understood, and even its true chemical composition is unknown. The compound of hæmoglobin with oxygen, called oxyhæmoglobin, may be converted into hæmoglobin by keeping its concentrated aqueous solution for some time in a sealed tube. Crystalline hæmoglobin has a dark-red color, which differs somewhat with the direction from which the crystals are viewed. The crystals are very soluble in water, and combine readily not only with oxygen, but also with nitric oxide, carbon monoxide, and probably with carbon dioxide. When treated with acids or alkalies, hæmoglobin is decomposed, yielding (1) a proteid called globin, and (2) a colored substance known as reduced hæmatin, or hæmochromogen, which is readily converted, by oxidation, into hæmatin (q.v.).

Oxyhæmoglobin and probably hæmoglobin itself vary in chemical composition and in certain physical properties according to the source from which they are obtained. The preparation of a considerable quantity of oxyhæmoglobin from the blood of certain animals is a matter of some difficulty. To obtain oxyhæmoglobin from dog's blood, the latter is defibrinated, strained, shaken with ether, and cooled, the oxyhæmoglobin separating out in the form of a crystalline mass; it may be purified by recrystallizing from very little cold water, a small amount of alcohol being added to the aqueous solution. The crystals of oxyhæmoglobin have a bright scarlet color like that of arterial blood. Their constituent elements are carbon, hydrogen, oxygen, nitrogen, sulphur, and iron. Nothing, however, is known of the chemical structure of oxyhæmoglobin, and its molecular weight appears to be at least as high as 13,000.

Carbon-monoxide hæmoglobin may be obtained by passing carbon-monoxide gas through an aqueous solution of oxyhæmoglobin. The highly poisonous action of carbon monoxide is due to the formation of this stable compound in the blood, by which the latter loses its capacity for carrying oxygen. Caustic soda solution produces, in blood containing carbon-monoxide hæmoglobin, a brilliant red precipitate; in normal blood the precipitate is of a brownish-green color. The presence of carbon monoxide in blood may thus be readily demonstrated by means of this test.

HÆMOGLOBINURIA. See Hæmaturia.

HÆ′MON. In the Theban legend, son of Creon, King of Thebes. See Antigone, 1.

HÆMOPHILIA, hĕm′ō̇-fĭl′ĭ-ȧ, or **HÆMATOPHILIA,** hĕm′ȧ-tō̇-fĭl′ĭ-ȧ (Neo-Lat., from Gk. *αἷμα*, *haima*, blood + *φιλία*, *philia*, friendship, from *φιλεῖν*, *philein*, to love). A constitutional disease, almost always hereditary, and characterized by a tendency to uncontrollable hemorrhage from slight wounds or even spontaneously. Various theories have been advanced to explain the hemorrhagic diathesis, but that of Sahli is now universally adopted as most in accordance with the facts. Sahli believes the disease to be due to a chemical alteration in the walls of the blood vessels, resulting in marked deficiency or absence of the fibrin ferment normally secreted when the wall of a vessel is cut or injured. Fibrin ferment is formed by the union of thrombogen and thrombokinase in the presence of calcium, and clotting of the blood is dependent upon it. Hæmophilia is more common in males than females, although the tendency is generally transmitted through the female line of descent. People who suffer from this condition are termed "bleeders." The prognosis is poor, most cases terminating fatally in childhood, and only about one-eighth of the patients reaching the adult age. The treatment is chiefly protective. Bleeding calls for the local application of cold and styptics. Preparations of the thyroid gland, suprarenal capsules, and the salts of calcium are often given with favorable effect; and the injection of normal human serum will control bleeding in many cases. In an emergency diphtheria antitoxin may be injected. The resulting anæmia is treated with iron. For a full treatise on this interesting condition, consult article by Pratt in Osler's *Modern Medicine*, vol. iv (New York, 1908; 2d ed., 1914). See Bleeding.

HÆMOP′TYSIS (Neo-Lat., from Gk. *αἷμα*, *haima*, blood + *πτύσις*, *ptysis*, expectoration, from *πτύειν*, *ptyein*, to spit). Raising blood from the lungs or respiratory passages by coughing. The blood may come from the blood vessels of the larynx, of the bronchi, or of the pulmonary vesicles. If the last alternative be true, the cause may be tuberculosis; or the bleeding may take the place of menstruation. In tuberculosis it generally follows breaking down of the lung tissue, or ulceration through the wall of a large blood vessel, though it may be the first symptom of disease noticed. It is not necessarily fatal and in most cases should cause no alarm as to immediate evil results. Indeed, where there is incipient tuberculosis, an early hemorrhage is even beneficial in that it at once relieves congestion and especially, by sharply calling attention to a diseased condition, induces the patient to place himself under proper treatment. It occurs most frequently in cases of slowly progressing tuberculosis. Bleeding from the lungs may occur without obvious cause, may be due to traumatism, pneumonia, pleurisy, rupture of an aneurism, to heart or liver disease, or to purpura. Rest and administration of morphine constitute the immediate treatment. Styptics, such as gallic and tannic acids, are of no use, and alcohol and other stimulants are to be avoided. In all cases of coughing up of blood the cause should be at once accurately ascertained, and suitable treatment promptly instituted, as the hope of permanent and complete cure in tuberculosis is largely bound up in prompt and systematic treatment while the disease is in the early stage. See Bleeding.

HÆM′ORRHOIDS. See Piles.

HÆ′MUS. The ancient name for the Balkan Mountains.

HÆRET′ICO COMBUREN′DO (Lat., for burning the heretic). An ancient writ of the English law, directing the execution of the sentence of burning a legally convicted heretic at the stake. While the trial of the charge of heresy was exclusively the function of the ecclesiastical courts, the punishment of the person convicted was assumed by the civil authority. The authority of the sheriff to execute the sentence was derived from the writ which issued in the name of the King from the royal court (*curia regis*) and later from the Court of King's Bench.

Death by burning was not a form of punishment for civil offenses in England, but was reserved for spiritual offenses, such as heresy, witchcraft, possession by the devil, and the like. The writ was last employed in the ninth year of James I, and was abolished by Act of Parliament in 1677 (29 Car. II, c. 9). It was never in use in the United States; though heresy and witchcraft were both punished in some of the Colonies, the former by exile and the latter by death, burning was never resorted to. See Heresy.

HAERING, hâ′rĭng, Theodor von (1848–). A German Protestant theologian, born in Stuttgart and educated at Tübingen and Berlin. He was pastor at Calw (1876–81) and at Stuttgart (1881–86) and became professor at Zurich in 1886, at Göttingen in 1889, and at Tübingen in 1895. He wrote: *Ueber das Bleibende im Glauben an Christus* (1885); *Zu Ritschls Versöhnungslehre* (1888); *Zur Versöhnungslehre* (1893); *Die Lebensfrage der systematischen Theologie* (1895); *Die Gerechtigkeit Gottes bei Paulus* (1896); *Das christliche Leben* (1902; 2d ed., 1906; Eng. trans., 1909, 1914); *Verständnis der Bibel* (1904); *Der christliche Glaube* (2d ed., 1912; Eng. trans., 1913).

HAFENREFFER, or **HAFFENREFFER,** hä′fen-rĕf′fẽr, Matthias (1561–1619). A German Lutheran theologian, born at Kloster Lorch, Württemberg. He studied philosophy and theology at Tübingen and in 1596 was appointed professor of theology and director of the theological seminary there. In 1617 he succeeded Andreas Osiander as chancellor of the university and as provost of the cathedral. As a theologian, Hafenreffer was an orthodox Lutheran and an opponent of Calvinism, although, unlike several of his contemporaries, he did not indulge in acrimonious polemics. His principal publication, the *Loci Theologici* (1600; frequently reprinted), was used as the official textbook of Lutheran dogmatic theology in Württemberg and Sweden, supplanting Heerbrand's *Compendium*.

His *Templum Ezechielis* was equally popular in its day.

HAFFKINE, hȧf′kĭn, Waldemar Mordecai Wolff (1860–). A Russian bacteriologist in the service of the government of India. He was born in Odessa, was educated at Berdiansk College and the University of Odessa, worked in the Odessa zoölogical museum, was an assistant in physiology in the Geneva Medical School in 1888–89, and Pasteur's assistant in Paris in 1889–93. In 1893 he began his important bacteriological work in India. The method of inoculation against cholera which he had discovered he himself used in 1893–94, treating 42,000 persons in 28 months with no bad effects. In 1897 he introduced into India an effective and successful system of inoculation against the plague. But in 1902 the method of manufacture was slightly changed (principally by the omission of carbolic acid), and nearly a score of natives inoculated with the new mixture died of tetanus. In 1907 Professor Haffkine was entirely exonerated and again took up his work, as there was nothing to prove that his laboratory had been at fault. Consult the letter of eminent British and American pathologists in the *Times* (London) of July 29, 1907, and Haffkine's *Protective Inoculation against Cholera* (1913).

HAFFKINE'S SERUM. See Plague.

HAFFNER, häf′nẽr, Paul Leopold (1829–99). A German prelate, born at Horb, Württemberg, and educated at Tübingen. He was ordained in 1852, was professor of philosophy and theology at Mainz (1855–66), and in 1886 was appointed by the Pope Bishop of Mainz, in which capacity he secured from the Hessian government a revision of the ecclesiastical laws. In 1888 he was chosen as the leader of the pilgrims who visited Pope Leo XIII on the occasion of his jubilee. Haffner founded several Catholic societies and wrote the work entitled *Grundlinien der Philosophie* (1881–83), besides many other books on German literature and theology.

HAFID, hä′fēd, Mulai (1873–). Sultan of Morocco from 1908 to 1912. He was educated at the University of El Azaar in Cairo, and for several years was Viceroy of southern Morocco. In August, 1907, he proclaimed himself Sultan and took the field against his half brother, Abd-el-Aziz, who then held the throne. Eventually he won the contest, and his authority was recognized by the European powers before the close of 1908. He was deposed and succeeded by another brother, Mulai Yussuf, in August, 1912. See Morocco.

HAFIZ, hä′fĭz (?–c.1388). A Persian poet of Shiraz, and one of the greatest names in lyrical poesy. The time when he flourished corresponds to the period of Chaucer's fame in the West; but it was not in the field of narrative poetry that Hafiz was great; he poured forth his spirit in the song of the nightingale and the rose, springtime and love, wine and delight. The date of his birth is not precisely known, but it must have been about the first quarter of the fourteenth century of our era. Hafiz's full name is given as Shams-ud-Din Muhammad, or Mohammed (the sun of religion); added to this is his title Hafiz (of retentive memory), given to one who knows the Koran and its interpretation by heart. His proficiency in various branches of knowledge brought him under the notice of the reigning house of Muzaffer, and not only was he appointed teacher in the house of the royal family, but a special college was founded for him. His spirit of independence, however, stood in the way of his worldly advancement, and notwithstanding many offers of princely favor, he remained during his whole life in the humble condition of a dervish. Although the burden of his poetical compositions is beauty in every form, we occasionally find also the praise of Allah and the Prophet, and reflections upon the instability of life and its joys; through all of them runs, however, a contempt of all professional piety and mock humility. These poems are of such sweetness that the poet has also received the name of Shakarlab (Sugarlip); and his contemporaries speak of his having drunk from the fountain of life, a draft of which was brought to him by Khizr (the Mohammedan Elijah) himself.

Hafiz was married and appears to have reached a happy old age. The time of his death is variously given, but 1388 A.D. is the date now generally assigned. The enmity, however, which had been provoked by the freedom of his manners, and his more than Sufistic contempt for the outward forms of godliness, broke out undisguisedly at his death. The ministers of religion refused to repeat the usual prayers over the dead body, and, after long altercations between the members of his family and his enemies, it was agreed that the question, according to the usual customs of the East, should be decided by lot. Verses selected at random from Hafiz's own handwriting were thrown into an urn, and one drawn out by a child to settle the question. The result was favorable, whereupon he was buried with great honor. Hence, perhaps, arose the custom, common in Persia, of consulting verses from Hafiz at random as an oracle. His tomb, situated about 2 miles to the northeast of Shiraz, has been sumptuously adorned by princes and nobles and is still resorted to by pilgrims from all parts of Persia.

How far some of the Ghazals (see Ghazal) of Hafiz are intended as an allegorical and mystical revelation of things divine in the manner of Sufism (q.v.), as is declared by Hafiz's admirers, is a question which has at different times been raised before ecclesiastical and critical courts. No doubt there is much in them that is Anacreontic, but it is equally certain that considerable weight must be given also to the Oriental interpretation of them as symbolic and mystical. The language and imagery of human love were largely employed in the East for the expression of union with the *Soul* and the *Spirit Divine.* The two passions often commingle in the expression of ecstasy; and parallels, e.g., in the early seventeenth-century English poets, like Donne, Vaughan, and Crashaw, might be noticed with profit in regard to this much-mooted problem. A style brilliant yet clear, imagery gorgeous yet clothed in pure and unaffected diction, undulating melody and classical harmony—these are the chief characteristics of Hafiz's Anacreontic lyrics, which have not only become the national poetry of his country, but are even appealed to as an oracle on most important questions of peace and war. The number of their commentators is legion; the most valuable notes, however, are those of Shamii, Suru, Sidi. The *Divan,* or collection of the writings of Hafiz, was first made after his death, by his friend Mohammed Gulandam. The *Divan,* in Hammer-Purgstall's translation, inspired many of the poems in Goethe's *Westöstlicher Diwan.* Lithographed editions abound, e.g., Calcutta, 1826; Bombay, 1828, 1841, 1883; Cawnpore, 1831; Bulak, 1834 and 1840; Constantinople, 1841; Lahore, 1888; Tashkend, 1895 and 1908. The best early edition, printed by Abu Talibkhan, appeared at Calcutta, 1795 (reprinted 1826). The most valuable edition is by H. Brockhaus (Leipzig, 1854–56), with a part of Sudi's Turkish commentary. Consult also Rosenzweig, with German metrical translation (3 vols., Vienna, 1856–64). Notice also the *Nami Press Hafiz with a Glossary* (Lucknow, 1899). Of older translations into European tongues, mention may be made of Rewitzki in Latin (Vienna, 1771); Richardson, Jones, Ouseley, Hindley, Rousseau, Bicknell (1876), in English; and by Hammer-Purgstall (1813) and Daumer, in German. Easily obtainable are: McCarthy, *Ghazels of Hafiz* (New York, 1893); Bell, *Poems from the Divan of Hafiz* (London, 1897); Leaf, *Versions from Hafiz* (ib., 1898); Payne (ib., 1901); Le Gallienne, *Odes from the Divan of Hafiz* (Boston, 1905). But most important is the valuable translation with extensive commentary, by H. Wilberforce Clarke (London, 1891). Consult also: Ouseley, *Persian Poets* (ib., 1846); Ethè, in *Grundriss der iranischen Philologie* (Stuttgart, 1896); Horn, *Geschichte der persischen Litteratur* (Leipzig, 1901); Veit, *Platens Nachbildungen aus dem Diwan des Hafis* (Tübingen, 1908).

HAFNER, häf′nẽr, PHILIPP (1731–64). An Austrian farce writer, born in Vienna. His principal productions are the following: *Der alte Odoardo und der lächerliche Hanswurst* (1755); *Die reisenden Komödianten* (1774), a comedy full of wit and humor; *Dramatische Unterhaltungen unter guten Freunden* (1774). His collected comedies were published by Joseph Sonnleithner in 1812 (Vienna).

HA′GAR. According to the Book of Genesis (xvi; xxi. 9–21) handmaid of Sarah, concubine of Abraham, and mother of Ishmael. Sarah, having remained barren up to an advanced age, gave Hagar to Abraham for a concubine after he had been in Canaan 10 years, in the hope of establishing a family of her own (Gen. xvi. 1–3; cf. Gen. xxx. 3–9). Afterward she repented of her action and treated Hagar cruelly, so that Hagar fled into the desert, but returned on being comforted by an angel, and bore Abraham a son who was called Ishmael (q.v.). After the birth of Isaac Sarah urged Abraham to drive Hagar and Ishmael away, and, though reluctant to do so, the patriarch at God's command complied. The bondwoman and her son went again into the desert, where they were almost spent with famine when an angel appeared and prophesied greatness for Ishmael, and God showed Hagar a well of water. Hagar is said to be a "Mizrite," which is generally interpreted as "Egyptian," though some scholars think that it refers to the southwest part of Negeb (q.v.), while others, less probably, assume that it refers to a country in northwest Arabia. Many scholars hold that Gen. xvi and xxi. 9–21 are duplicate narratives of the same event; and this is not improbable. But the common assumption that the former was drawn from a source using the divine name "Yahwe," the latter from one employing the name "Elohim," is rendered very doubtful by the Greek version, the etymology of Ishmael (xvi. 11), where the original text read "El hath heard," and the name of the deity of the place "El roi" (xvi. 13). The story of the relationship of Hagar to Sarah, of the birth of Ishmael, of Sarah's treatment of Hagar and her son, and of the final dismissal of the pair appears to many scholars as an admirable illustration of the manner in which tribal conditions are portrayed under the guise of history. Hagar, they think, personifies a tribe that at one time stood in close relationship to some of the Hebrew clans. Rivalry ensued, and the result was a separation, which is pictured as a dismissal on the part of the clan regarding itself as the superior. Interpreted in this way, the various features of it seem to become clear. The opposition between Israelites and Ishmaelites leads the Hebrew writers so to construct genealogical traditions as to make Ishmael the son of the "handmaid," whereas Isaac is the offspring of the real wife, Sarah. As a justification for the separation of two nations having so much in common as Israel and Ishmael, it is represented (1) that Hagar, though the inferior, attempted to gain the supremacy, and (2) that Ishmael, the "inferior" offspring, failed to recognize the superiority of Isaac. The separation, which no doubt was voluntary on the part of the Ishmaelites, is therefore portrayed as a deliberate act of dismissal on the part of Abraham, in whom the genealogical traditions of Hebrews and Arabs are thus made to unite.

The story of Hagar and Ishmael was well adapted for homiletical and allegorical elaboration, and hence both in the New Testament and in Rabbinical literature the subject is frequently introduced. Hagar is contrasted with Sarah allegorically by St. Paul (Gal. iv. 22 et seq.), who makes Hagar, the bondwoman, represent the earthly Jerusalem, Sarah, who is free, the heavenly, and contrasts Ishmael and Isaac in a similar way. A Jewish tradition identifies Hagar with Abraham's second wife, Keturah (Gen. xxv. 1), and another makes her the daughter of Pharaoh. The Mohammedans look upon Hagar as Abraham's true wife and upon Ishmael as the favorite son. Consult the commentaries on Genesis by Dillmann, Gunkel, Holzinger, and Delitzsch, and for further amplification of the Hagar-Ishmael tradition in Jewish and Mohammedan writings, Grünbaum, *Neue Beiträge zur semitischen Sagenkunde* (Berlin, 1901); Beer, *Das Leben Abrahams nach Auffassung der jüdischen Sage* (Leipzig, 1859); Weil, *Biblical Legends of the Mussulmans* (trans., London, 1846).

HAGAR, STANSBURY (1869–). An American ethnologist and lawyer, born in San Francisco, Cal. He graduated at Yale in 1892, at the New York Law School in 1897, and became an investigator of native American archæology and ethnology. For this purpose he made studies in Peru, among the Cherokee Indians of North Carolina and the Micmacs of Nova Scotia, and in various European museums.

HAGARTY, hăg′ar-tĭ, SIR JOHN HAWKINS (1816–1900). A Canadian jurist. He was born in Dublin, Ireland, and was educated at Trinity College. He came to Toronto, Canada, in 1835, was called to the bar in 1840, and, soon attaining a large practice, in 1850 became a Queen's counsel. He was made a judge of the Court of Common Pleas in Upper Canada (Ontario) in 1856, a judge of the Court of Queen's Bench in 1862, Chief Justice of the Common Pleas in 1868, Chief Justice of the Queen's Bench in 1878, and president of the Court of Appeal and of the Supreme Court of Judicature, with the title of Chief Justice of Ontario, in 1884. He was knighted in 1897 on the occasion of Queen Victoria's diamond jubilee. Judge Hagarty was also a member of the law faculty of Trinity University, Toronto. He was a man of fine literary culture and wrote some pamphlets and poems of considerable merit. As a criminal judge, he was especially well known. He retired from the bench in 1897 and received on that occasion a highly appreciative address from the bench and bar of Ontario.

HAGBERG, häg'bĕry', Karl August (1810–64). A Swedish writer on æsthetics and linguistics. He was born at Lund, studied at Upsala, where he became instructor of Greek in 1833, and, after two years in Germany and in France, where he became personally acquainted with Hugo and Lamartine, was appointed in 1840 professor of modern languages and of æsthetics at Lund. There he spent 11 years in the preparation of his excellent translation of Shakespeare (12 vols., 1847–51; many later editions), and on its publication was named a member of the Swedish Academy, a post in which he made great contributions to the lexicon of that body. Hagberg's later years were devoted to the study of old Norse dialects. In 1859 he was elected to a chair at Lund for instruction in Norse. Besides a sketch of modern French thought, *Om den nya fransyska vitterheten* (1837), Hagberg wrote little.

HAG'BERRY. See Hackberry.

HAG'DEN. See Shearwater.

HAGEDORN, hä'ge-dôrn, Friedrich von (1708–54). A German poet. He was born in Hamburg, studied law in Jena, and was secretary to the Danish Minister at London in 1729–31. In 1733 he became secretary to the "English Court," a Hamburg trade association of English merchants. His poetry is of a varied character—sentimental, satirical, didactic—but all is marked by good taste and careful elaboration. He has been credited with originating the modern German *Gesellschaftslied,* or glee, and was the first of several German fable writers of the eighteenth century. He is best known for his graceful songs, many of which were set to music, and for his humorous fable in verse *Johann der muntere Seifensieder.* There is an edition of his works, with a biography and critique, prepared by Eschenburg (5 vols., 1800). Consult: Schuster, *Friedrich von Hagedorn und seine Bedeutung für die deutsche Litteratur* (Leipzig, 1882); Eigenbrodt, *Hagedorn und die Erzählung in Reimversen* (Berlin, 1884); Witkowski, *Die Vorläufer der anakreontischen Dichtung und Friedrich von Hagedorn* (Leipzig, 1889); and Muncker's introduction to Hagedorn's poems in vol. xlv of Kürschner's *Deutsche National-Litteratur* (Berlin, 1892).

HAGELA'DAS, or **AGELA'DAS** (Ἀγελάδας or Ἀγαλάδας) (c.540–460 B.C.). A Greek sculptor, of Argos, famous for his representations of gods and, especially, of victors at the Olympian games. Prominent among his works were a statue of Zeus Ithomatas, fashioned for the Messenian exiles whom the Athenians established at Naupactus, in 459 B.C.; statues of Zeus and Heracles made for the city of Ægium, in Achæa; and a group of horses and captive women dedicated by the Tarentines to commemorate a victory over the Messapians, a people in the southeastern part of Italy. An ancient tradition, questioned by some scholars in recent times, declares that Hageladas was teacher of Phidias, Myron, and Polyclitus; in support of the tradition consult E. A. Gardner, *A Handbook of Greek Sculpture* (London, 1911). Consult also the article "Hageladas," by Pfuhl, in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft,* vol. vii (Stuttgart, 1912).

HAGEN, hä'gen. The capital of the district of the same name in the Prussian Province of Westphalia, 44 miles from Cologne. It lies in a deep wooded valley where the Ennepe joins the Volme. It is an important industrial centre manufacturing machinery, castings, steel, forgings, wire, tinware, railway and telegraph supplies, iron safes, screws, vehicles, heating and ventilating apparatus, gymnastic and fire-fighting apparatus, cotton and print goods, paper, tobacco, liquors, and leather. In the neighborhood are alabaster and chalk quarries. It has a Gymnasium, an industrial school, and an industrial museum. The Folkwang, or art museum, has an excellent collection of Japanese and Chinese paintings as well as works by Millet, Watts, Manet, Rodin, and Meunier. There are electric street railways. Hagen is mentioned as early as the eleventh century, when it belonged to the Archbishop of Cologne. It received municipal rights from Friedrich Wilhelm I of Prussia. Pop., 1900, 50,612; 1910, 88,605.

HAGEN, or **HAGEN VON TRONEGE,** hä'gen fȱn trō'ne-ge. One of the most powerful creations of old German myth. His early life is spent as a hostage at the court of Attila, from which he escapes with Gunther. He carries out Brunhild's vengeance by murdering Siegfried and is finally captured by Dietrich von Bern and taken before Kriemhild, who slays him with Siegfried's sword when he refuses to disclose the Nibelungen treasure.

HAGEN, Friedrich Heinrich von der (1780–1856). A German philologist, born at Schmiedeberg and educated at Halle (1797–1800). In 1810 he became assistant professor of German literature at the University of Berlin, then just established. In the following year he was called to Breslau and in 1821 was recalled, as full professor, to Berlin, where he was four times dean of the philosophical faculty. He did much to stimulate interest in Germanic literature, though his critical methods have gradually been superseded. Besides his important text editions of the *Nibelungenlied* (1810), of the elder *Edda* (1812), and of the works of *Gottfried von Strassburg* (1823), his principal works include: *Erzählungen und Märchen* (2d ed., 1838); *Nordische Heldenromane* (1814–28); *Tausendundein Tag: Morgenländische Erzählungen* (1838); *Ueber die ältesten Darstellungen der Faustsage* (1844); *Das Heldenbuch* (1855); the great collection of *Minnesinger* (5 vols., 1838–56), still exceedingly useful to scholars; the *Gesammtabenteuer* (3 vols., 1850), a collection of old German tales in verse.

HAGEN, Gotthilf (1797–1884). A German hydraulic engineer. He was born and educated at Königsberg, Prussia, and at first devoted himself to astronomy. In 1816, on behalf of the Berlin Academy of Sciences, he observed at Kulm the total eclipse of the sun, and in 1831 was appointed instructor at the Prussian Artillery and Engineering School, and also taught hydraulic engineering at the Academy of Architecture. He designed and directed the construction of the naval harbor at Wilhelmshafen, on the

Jade estuary (completed 1869), and now one of the principal fortified naval stations on the North Sea. In 1869 he was appointed director in chief of the building department of Prussia. His principal publications are the following: *Handbuch der Wasserbaukunst* (1841–65), an exhaustive work which has passed through several editions; *Grundzüge der Wahrscheinlichkeitsrechnung* (1841; 3d ed., 1882; supplement, 1884); *Ueber Form und Stärke gewölbter Bogen* (2d ed., 1874); *Ueber die gleichförmige Bewegung des Wassers* (1876).

HAGEN, Johannes Georg (1847–). An Austrian mathematician and astronomer, born at Bregenz. He was educated at the Gymnasium Feldkirch and at the University of Münster and Bonn, and he studied theology in England in 1875–80. He became a member of the Society of Jesus. From 1880 to 1888 he taught mathematics and physics at Prairie du Chien, Wis., and from 1888 to 1906 he was director of the Georgetown University Observatory. In 1906 he was called to Rome to take charge of the Vatican Observatory. His publications include: *Synopsis der hoheren Mathematik* (3 vols., 1891–1905); *Index Operum Leonardi Euleri* (1896); *Atlas Stellarum Variabilium* (6 series, 1899–1908); *Beobachtungen veränderlicher Sterne von Heis und Kruger* (1903); *La rotation de la terre* (1911); *Die veränderlichen Sterne* (1913).

HAGEN, Karl Gottfried (1749–1829). A German physician and apothecary, born at Königsberg, Prussia. He was appointed professor of medicine at the University of Königsberg in 1779 and professor of chemistry, physics, and natural history in 1807. His lectures, which he continued until his death, exercised a far-reaching influence. His best-known work is *Lehrbuch der Apothekerkunst* (1805; 8th ed., 1829).

HAGEN, Otto von (1817–80). A German forester, born at Ilsenburg and educated at Berlin and at the Academy of Forestry in Eberswalde. In 1863 he was appointed chief of the Prussian department of forestry and curator of the Academy of Forestry at Eberswalde, and in 1868 was made curator of the Academy of Forestry at Münden. In 1880 he was appointed ministerial director of forestry, under the Minister of Agriculture. His chief work was in connection with the reorganization of the system of forest management in the provinces of Schleswig-Holstein, Hanover, and Hesse-Nassau. His principal work is entitled *Die forstlichen Verhältnisse Preussens* (1867; 3d ed., 1894).

HAGEN, Theodor (1842–). A German landscape painter, born at Düsseldorf. He was the pupil of Andreas and Karl Müller at the Düsseldorf Academy and afterward of Oswald Achenbach. In 1871 he was appointed professor, and in 1877 director, of the art school at Weimar, but resigned both positions in 1880. At the exposition of 1891 in Berlin he was awarded a gold medal. His landscapes are homely and simple, painted with straightforward naturalism, interesting light effects, and fine sentiment. Among the best are: "View of Kanderthal, Switzerland"; "A Storm"; "A Village in Spring"; "Saint-Gotthard"; "View of Scheveningen"; "View of Zons near Düsseldorf" (Dresden Gallery); "The Fleet" (Hamburg Gallery).

HAGENAU, hä′ge-nou. Capital of the district of the same name in Lower Alsace, Germany, situated on the Moder, 18 miles north of Strassburg (Map: Germany, B 4). It has two notable churches, St. George and St. Nicholas. Other notable institutions are a Gymnasium, museum, and public library. It makes woolen yarn, chinaware, shoes, sparkling wine, and beer; many hops are raised. Near by is the Hagenouer-Wald, with its artillery ranges. The town was founded in the twelfth century by Conrad III. It was strongly fortified by Frederick Barbarossa, and in 1164 obtained a constitution and special privileges. It became a free town in 1257 and in the fourteenth century was at the head of the league of Alsatian free towns. By the Treaty of Westphalia, Hagenau passed to France, and its fortifications were destroyed in 1673. In 1871 it came into the possession of Germany. Pop., 1900, 17,993; 1910, 18,868.

HAGENAU, Reinmar von. See Reinmar von Hagenau.

HAGENBACH, hä′gen-bäg, Karl Rudolf (1801–74). A German Church historian. He was born March 4, 1801, at Basel, where his father was professor of anatomy and botany. After being professor extraordinary at Basel (1824), he became full professor in 1828. He lectured to public audiences and afterward published several courses of lectures on the nature and history of the Reformation, on the early history of the Church, and on the Church history of the eighteenth and nineteenth centuries, which were gathered into a collected edition (1869–72) and after his death edited by F. Nippold (Leipzig, 1885–87). The portion relating to the history of the Reformation in Germany and Switzerland was translated by E. Moore (Edinburgh, 1878–79) and that on the eighteenth and nineteenth centuries by J. F. Hurst (New York, 1869). Two other of his popular yet scholarly works have been translated—*A Text-Book of the History of Doctrine* (orig. Leipzig, 1840; 6th ed. by Benrath, 1888; trans. from the 5th ed., Edinburgh, 1880); and his *Theological Encyclopædia and Methodology* (orig. Leipzig, 1833; 12th ed. by Reischle, 1889; worked over by Crooks and Hurst, New York, 1884; new ed., 1891). He was an admired preacher (*Predigten*, Basel, 1858–75) and a poet (*Gedichte*, Basel, 1846). He edited the *Kirchenblatt für die reformierte Schweiz* (from 1845 to 1868); also the valuable series of biographies of the reformers of the Reformed church, with selections from their writings (*Leben und Schriften der Väter und Begründer der reformierten Kirche*, 10 vols., Elberfeld, 1857–62), to which he contributed the lives of Œcolampadius and Myconius (1859). He died in Basel, June 7, 1874. Consult his brief autobiography in *Erinnerungen an K. R. Hagenbach* (Basel, 1874) and the fuller sketch by Eppler (Gütersloh, 1875).

HAGENBACH, Peter von (?–1474). Grand Bailly of Alsace. He was a soldier and lawyer under Charles the Bold of Burgundy, who appointed him Grand Bailly of Alsace, where his cruelties caused general protest from the neighboring Swabian and Swiss communities and may be said to have led to the war between Switzerland and Burgundy which resulted in the complete ruin of Charles. Consult Kirk, *History of Charles the Bold* (London, 1863–68), and Barante, *Histoire des ducs de Bourgogne* (Paris, 1824–26).

HAGENBECK, hä′gen-bĕk, Karl (1844–1913). A German trainer of animals and circus manager. He was born at Hamburg, where his father in 1852 established a considerable trade in animals. The business, which in 1866 passed into the hands of the son, was greatly enlarged by him. In order to obtain animals from Africa and other countries several transports were annually sent out from Hamburg. Hagenbeck traveled through Europe, giving ethnological exhibitions representing the life of the various races of Africa, Oceanica, and of the Far North. In 1886 he visited the United States, where he conceived the idea of organizing a circus. During the Chicago Exposition (1893) he revisited America, bringing with him about 1000 animals, including lions, tigers, bears, leopards, and wild boars. In 1907 he opened at Stellingen, a suburb of Hamburg, his remarkable zoölogical garden, covering about 36 acres, and containing a very large collection of mammals and birds, most of them shown in surroundings which closely reproduced their natural habitats. A unique feature was the placing of the large mammal groups in outdoor inclosures with no box or gratings in sight, the animals being confined by means of broad moats filled with water. Hagenbeck, who was styled "the Moltke of menagerie owners," was the first showman to train large carnivorous animals of different species to perform together. His methods and many of his adventures are described in his book, *Beasts and Men* (London, 1909).

HA′GER, Albert David (1817–88). An American geologist, born in Chester, Vt., and educated in the public schools of his native town. He was appointed assistant naturalist of Vermont in 1856, assistant State geologist under Edward Hitchcock from 1857 to 1861, State geologist from 1861 to 1870, and Vermont commissioner to the Paris Exposition of 1867. From 1870 to 1877 he was State geologist of Missouri and in the latter year was appointed librarian of the Chicago Historical Society. He published *Geology of Vermont* (2 vols., 1861, with Prof. Edward Hitchcock) and other reports of surveys in his native State and in Missouri.

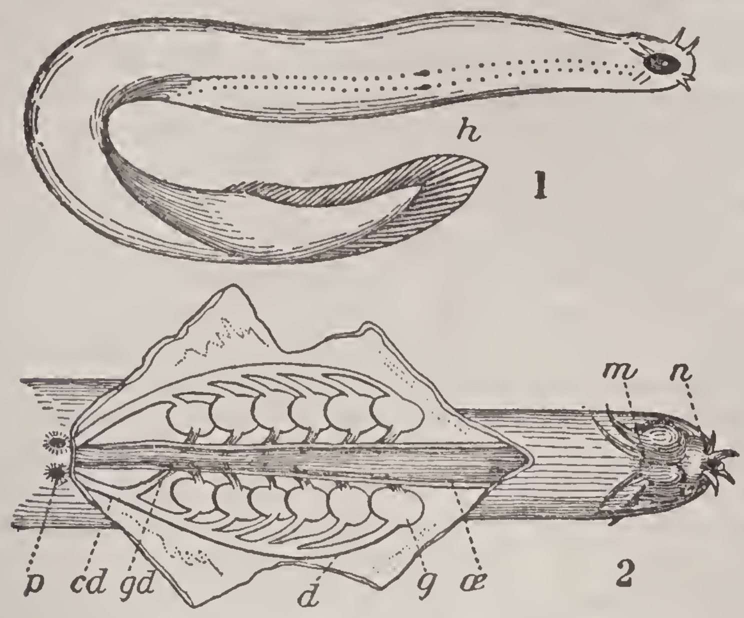
HAGER, hä′gẽr, Hans Hermann Julius (1816–97). A German writer on pharmacy, born at Berlin. Both as editor of the *Pharmazeutische Centralhalle* at Berlin and as an author, he did much to advance pharmaceutical science. His exposition and published analyses of secret remedies are especially valuable. His more important publications include: *Handbuch der pharmazeutischen Rezeptirkunst* (1850; 5th ed., 1890); *Manuale Pharmaceuticum* (vol. i, 6th ed., 1891; vol. ii, 3d ed., 1876); *Anleitung zur Fabrikation künstlicher Mineralwässer* (2d ed., 1870); *Erster Unterricht des Pharmazeuten* (2 vols., 4th ed., 1885); *Handbuch des pharmazeutischen Praxis* (3 vols., 8th ed., 1885); *Das Mikroskop und seine Anwendung* (11th ed., 1912).

HAGERMAN, hā′gẽr-man, James (1848–1913). An American lawyer. He was born in Clark Co., Mo., and was educated in public and private schools and at the Christian Brothers College, St. Louis, Mo. He was admitted to the Missouri bar in 1866 and practiced at Keokuk, Iowa, until 1884; was general attorney of the Atchison, Topeka, and Santa Fe Railway Company in 1884–86 and general solicitor of the Missouri, Kansas, and Texas system from 1887 to 1904, and served as general counsel after 1904. He was elected president of the St. Louis Bar Association in 1899 and of the American Bar Association in 1903.

HA′GERSTOWN. A city and the county seat of Washington Co., Md., 78 miles west-northwest of Baltimore, on the Baltimore and Ohio, the Cumberland Valley, the Norfolk and Western, and the Western Maryland railroads (Map: Maryland, D 1). It was the seat of Kee Mar College for women and contains Washington County Free Library and a hospital; while in the vicinity are Fort Frederick and the battlefields of Antietam and Gettysburg. Hagerstown is of considerable commercial importance, owing to its facilities as a railroad centre. The industrial establishments include railway and machine shops, flour, silk, and knitting mills, pipe-organ, cigar, match, furniture, automobile, ice, and fertilizer factories, metal works and foundries, bicycle, spoke, and bending works, carriage and wagon factories, boiler works, etc. The city, under a revised charter of 1895, is governed by a mayor and a unicameral council. An electric-light plant is owned by the city. Hagerstown was settled about 1740 and laid out in 1762 by Jonathan Hager. It was first known as Elizabethtown and was incorporated in 1791. The present charter was received in 1848. During the Civil War it figured prominently as a base of operations. Pop., 1900, 13,591; 1910, 16,507; 1914 (U. S. est.), 17,749.

HAGERUP, hä′ge-ru̦p, Georg Francis (1853–). A Norwegian jurist and statesman, born at Horten, near Christiania, son of a naval officer. He was educated at Christiania, Munich, Leipzig, and Paris; in 1879 he became lecturer and in 1885 professor of law in the University of Christiania. He was prominent in politics as a leader of the Right, was Minister of Justice in 1893–95 in Stang's cabinet, headed the coalition ministry of 1895–98, and was Premier again in 1903–05 during the middle part of the crisis between Norway and Sweden. In 1906 he became Minister at Copenhagen. He took part in several cases of international arbitration, was a member of The Hague Arbitration Court after 1903, was a delegate from Norway to the second Peace Congress, and acted as a member of the committee for the award of the Nobel peace prize.

HAG′FISH, or **HAG** (ME. *hagge, hegge*, from AS. *hægtes*, witch, MDutch *haghetisse*, OHG. *hagazussa*, Ger. *Hexe*, hag, witch; apparently connected with provincial Eng. *hag*, AS. *haga*, Dutch *haag*, Ger. *Hag*, inclosure, coppice). Any of several species of roundmouths (see Cyclostomi) that live parasitic upon fishes and structurally are closely related to the lamprey (q.v.). They are eel-shaped in form, and individuals of the genus *Bdellostoma* may reach a length of 3 feet. The common hag, or slime eel (*Myxine glutinosa*), may grow to be 18 inches long and is found on both coasts of the north Atlantic south to Cape Cod. The mouth is formed by a mere membranous ring with a single tooth on its upper part, while the tongue is furnished with two rows of strong teeth and also performs the office of a piston in the use of the mouth as a sucker. Around the mouth are eight tentacles. The skin is smooth and capable of secreting an enormous amount of mucus. There is only a membranous caudal fin. The eyes are very rudimentary and sunk beneath the skin. The six gill pouches empty separately internally into the pharynx, but externally by a single tube. There are no bones; the skeleton is membranous and cartilaginous. The eggs are large, are inclosed in a horny case, and bear hooked processes at each end for attachment to weeds, etc. Myxine is hermaphroditic; the young animal produces sperms and, later in life, ova. By means of the mouth the hags bore their way into the body of fishes, especially halibut and flounders, consuming them, leaving only the entrails, skeleton, and skin; hence another common name is "borer."



HAGFISH (*Myxine glutinosa*).

1. Outline of the hag, showing the two ventral openings (*h*) by which the water escapes from the gills. 2. Anterior portion of the body laid open on the ventral side to show the branchial sacs. *æ*, gullet laid open, showing on each side the six apertures by which the water is conducted to the corresponding branchial pouches (*g*); *d*, one of the efferent ducts by which the water is conducted away from the branchial pouches; *cd*, common efferent duct on the left side, opening on the ventral surface by a branchial pore (*p*, or *h* of Fig. 1); *gd*, special canal developed on the left side only, and leading from the gullet into the common branchial duct; *n*, unpaired nostril, with its "barbels"; *m*, mouth.

The hag on the west coast of America (*Polistotrema stouti*) is hated by the fishermen because of its destruction of fishes caught in nets and its ugly appearance. It is about 14 inches long. See MYXINE, and Plate of LAMPREYS AND DOGFISH.

HAGGADA, hăg-gä′dȧ (Heb., narration, from *higgīd*, to narrate). The free rabbinical interpretation of Scripture, chiefly for homiletical purposes. Haggada is thus contrasted to *Halacha* (q.v.), 'rule,' which represents the authoritative interpretation of biblical laws for practical purposes. The Haggada developed side by side with the Halacha, and the two tendencies are found combined in the great compilation of rabbinical theology known as the *Talmud* (q.v.). But while the Haggadic sections in the Talmud are considerable, the great bulk of the Haggadic interpretation of the Old Testament is to be found in a number of separate compilations known as *Midrashim.* (See MIDRASH.) The oldest of these collections, adapted to the order of the biblical books, in which the interpretations run parallel with the text, are: (1) the *Mechilta*, a collection of Haggadic interpretations to the Book of Exodus; (2) the *Siphra* to Leviticus; (3) *Siphre* to Numbers and Deuteronomy. Far more extensive, however, is the collection known as the *Midrash Rabbah*, or 'Great Midrash,' comprising the Haggada to the entire Pentateuch and to the five scrolls (read on the various festivals of the year), Esther, Ruth, Lamentations, Ecclesiastes and Song of Songs. By the side of the compilation (concluded c.900 A.D.) may be mentioned the *Pesikta* to various sections of the Old Testament and the *Tanchuma* to the Pentateuch. On the basis of this Midrashic literature, a large number of works were produced through the Middle Ages to our own days, containing selections from the earlier compilations as well as additions and amplifications. Among these may be mentioned the *Midrash hagadol*, 'the Great Midrash,' a Yemenitic compilation now being published by Dr. S. Schechter for the Cambridge University Press. *Haggada shel Pesach* is the name of ritual, partly in Hebrew, partly in Aramaic, used on the first two evenings of the Passover, which contains, besides a brief description of the Exodus, extracts from the Scripture, the Mishna, Tosephta, Mechilta, Siphra, and the two Talmuds, and some liturgical pieces, all bearing more or less directly on the oppression in Egypt and the deliverance. Originally within very small compass, it has been extended to its present larger size by subsequent centuries. Two *Piutim*, or religious poems, were added in the eleventh century, and four more Hebrew and Aramaic songs (the last originally a German *Volkslied*) as late as the fourteenth century. Consult: Winter and Wünsche, *Die jüdische Litteratur* (Trier, 1894); Karpeles, *Geschichte der jüdischen Litteratur* (Berlin, 1886); Steinschneider, *Jewish Literature* (Eng. trans., London, 1857); Chenery, "Legends from the Midrash," in Loewy, *Miscellanies of Hebrew Literature* (London, 1877); Bacher, *Die Aggada der Tannaiten* (2 vols., Strassburg, 1884–90).

HAGGAI, hăg′gȧ-ī (probably 'born on a feast day'). A Jewish prophet of the postexilic period and contemporary with the prophet Zechariah, with whom he was associated (Ezra v. 1; 3 Esdras vi. 1, vii. 3). He prophesied in Jerusalem. The date of his work is fixed by his own writing (chap. i. 1, 15; ii. 1, 10) in the second year of Darius Hystaspis (520 B.C.). Concerning his own history nothing is known. The inference drawn from his work (ii. 3), that he had in his youth seen the former temple in its glory, may be correct, in which case the prophecies that we have from him would represent compositions produced in his old age. The Book of Haggai consists of four discourses, the delay in the rebuilding of the sanctuary furnishing the general motive. The prophet is represented as appearing before Zerubbabel and Joshua, the high priest, and strongly urging the reëstablishment of the sanctuary, pointing at the same time to the famine in the land as the divine punishment for the culpable neglect of the people, who thought only of their own houses and not of that of God. His words made a deep impression, and the building was commenced (chap. i). The second discourse, about a month later, predicts a still greater glory for the new temple than had belonged to the former (ii. 3–9). Two months later he had to renew his reproaches against their inertness, and his promises of a blessed future (ii. 10–19). The fourth discourse (ii. 20–23), delivered on the same day, is directed to Zerubbabel, and, while foretelling great revolutions and political changes, promises that Zerubbabel shall remain a "signet" in the hands of God—an implication apparently that Zerubbabel is to become King. The style of Haggai is prosaic and labors under an uncommon tameness and poverty of expression, principally apparent in the frequent repetition, within the short space of two chapters, of certain words and phrases, which could not well have been purposely retained for the sake of ornamentation. There is hardly any parallelism; but the prophet has endeavored to impart a certain vivacity to his writing by means of interrogation. The diction itself is, generally speaking, pure and clear. The contrast between Haggai and Zechariah, who have much in common, and the older prophets of the type of Jeremiah and Isaiah, is striking. Whereas the latter are concerned chiefly with ethical problems, the interest of the former is largely centred in the temple and the cult. They reflect in this respect the tendencies of the postexilic period. Consult the general commentaries on the Minor Prophets (q.v.); Perowne, "Haggai and Zechariah," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1886); Tony André, *Le Prophète Aggée* (Paris, 1895); Mitchell, *Haggai and Zechariah* (New York, 1912).

HAG′GARD, Sir Henry Rider (1856–). An English novelist, born at Bradenham Hall, Norfolk. He spent some time in South Africa (1875–79), where he became Master of the High Court in the Transvaal. On his return to England he practiced law. After two moderately successful experiments in fiction, he produced *King Solomon's Mines* (1885) and *She* (1886), which won him instant fame by a certain kind of imaginative power and by their novelty of scene. In 1912 he was knighted. His later novels include *Jess* (1887); *Allan Quatermain* (1888); *Cleopatra* (1889); *Montezuma's Daughter* (1894); *The People of the Mist* (1894); *Swallow: A Story of the Great Trek* (1899); *Elissa: A Zulu Idyll* (1900); *The Brethren* (1904); *Ayesha or the Return of She* (1905); *Queen Sheba's Ring* (1908); *Red Eve* (1911); *Child of Storm* (1913). He studied the rural conditions of England and the Salvation Army colonies in England and the United States, and published *Rural England* (1902); *A Gardener's Year* (1905); *The Poor and the Land* (1905); *Report on the Salvation Army Colonies* (1905).

HAG′GART, John Graham (1836–1913). A Canadian statesman. He was born and educated in Perth, Ontario, was for some time mayor of this town, several times was an unsuccessful Conservative candidate for the Ontario Legislature, and in 1872 was elected a member of the House of Commons. Appointed (1888) Postmaster-General in the administration of Sir John A. Macdonald, he remained in that office until 1892, in the administration of Sir J. J. C. Abbott, and was then Minister of Railways and Canals in the administrations of Sir John Thompson, Sir Mackenzie Bowell, and Sir Charles Tupper, until the defeat of the Conservative party in 1896. In 1892 also he was elected chairman of the Liberal Conservative Union of Ontario. Haggart was considered by many influential Conservatives to be best fitted for the premiership after the death of Sir John Thompson. During his administration of the railways and canals department the Sault Ste. Marie Canal was completed, the last link in the chain of canals connecting the Great Lakes with the St. Lawrence. In 1912 he retired from political life.

HAGGENMACHER, hä′gen-mäg′ẽr, Gustav Adolf (1845–75). A Swiss explorer of Africa, born on the island of Limmatau, near Brugg, Switzerland. In 1865 he went to Egypt and made up a caravan to travel to Khartum, where he settled as a merchant in 1866. In 1869 he traveled through Abyssinia and proceeded to Suakin and thence to Massowah. In 1872 he was the commissioner of Egypt at the World's Fair, Vienna, where his exhibition of Sudanese products attracted general attention. In the fall of the same year he went to Cairo. There he resided until 1874, when he was appointed the representative of Consul Munzinger at Kassala; thence, by order of the Khedive, he undertook a tour through Somaliland. In the following year he proceeded as far as Galabat. He accompanied Munzinger during the campaign against the Galla tribe, taking with him his wife and two children. On the return journey the family were murdered by the natives.

HAGGIN, James B. (1827–1914). An American capitalist, born at Harrodsburg, Ky. He practiced law at St. Joseph, Mo., and later at Natchez, Miss., until 1849. He then went to California, acquired a large fortune in mining enterprises, organized the "silver trust" with other large capitalists, and became owner of the interests of Marcus Daly in the Anaconda Copper Company. He also had a large ranch and notable stock farms in Kentucky.

HAGHE, hâg, Louis (1806–85). A Belgian lithographer and water-color painter, active chiefly in England. He was born at Tournay, and learned drawing from his father, an architect, and at the Academy of Tournay. His right hand being deformed from birth, he drew with the left. At the age of 17 he made drawings for De Jonghe's *Vues pittoresques de la Belgique* and soon afterward went to England. At London he formed a partnership with William Day, producing a series of lithographic works of the highest merit. Among these were Vivian's *Spanish Scenery,* Atkinson's *Views in Afghanistan,* Robert's *Sketches in the Holy Land, Syria, Idumea, Arabia, Egypt, and Nubia,* and lithographs of his own drawings of old Flemish interiors. From 1852 he devoted himself to painting in water colors and was president of the Society of Painters in Water Color from 1873 till 1884. Haghe displayed a predilection for old Flemish interiors, but also painted Italian subjects and scenes from English history. Among the best are the "Council of War at Courtray" (1854), in the National Gallery, and the "Audience Chamber at Bruges," which are remarkable for their harmony of color, fidelity in detail, and richness of architectural decoration. There are good examples of his work in the South Kensington (21 aquarelles), British, and Bethnal Green museums. He obtained the gold medal for lithography at Paris in 1834, and was a member of the Belgian and Antwerp academies.

HAGI, hä′gē. A town in the Japanese Prefecture of Yamaguchi, situated on the east coast of Nippon, near the south end of the island (Map: Japan, B 6). In feudal times it was the residence of the daimios of Choshu and played a prominent part in the abolition of feudalism. Pop., about 25,000.

HAGIA SOPHIA, hä′gī-ȧ sō-fē′ȧ (Holy Wisdom, i.e., Wisdom of God). The name of a Christian church in Constantinople, now a Mohammedan mosque, called by the Turks Aya Sofia and by Europeans generally *Santa Sophia,* or St. Sophia, which is a mistranslation of the Greek original. See Saint Sophia.

HA′GIOG′RAPHA. See Bible.

HAGN, häg′n, Ludwig von (1820–98). A German genre painter. He was born in Munich and was educated at the military school there, but, preferring the life of an artist to that of a soldier, he studied at the Munich Academy, at

Antwerp under De Bloch, and at Berlin, where he was influenced by Menzel. He lived at Paris in 1853–55 and also in Italy, returning permanently to Munich in 1868. He depicts the graceful comedies of real life in rococo or baroque settings, often with great distinction of color. His chief works include "Conversation" (Orangerie, Potsdam); "Unwelcome Wooing" (1851, Schwerin Gallery); "Musical Morning Entertainment" (1859, Pinakothek, Munich); "Italian Garden Scene" (1868, Schack Gallery, Munich); "Audience with Pope Leo XIII" (1880); and "Corpus Christi Procession in the Seventeenth Century" (1881), for the Munich City Hall.

HAGONOY, ä′gō̇-nō′ē̇. A town of Luzon, Philippines, in the Province of Bulacán, founded in 1581. It lies on the left bank of the Nayo Grande River, 10 miles west of Bulacán. It manufactures textiles. Pop., 1903, 21,304.

HA′GOOD, Johnson (1829–98). An American soldier, born at Barnwell, S. C. He graduated in 1847 at the South Carolina Military Academy, and at the outbreak of the Civil War became colonel of the First South Carolina Volunteers. In 1862 he was made a brigadier general in the Confederate army. He served on the South Carolina coast and commanded Battery Wagner in the siege of Charleston. At the siege of Petersburg he commanded a brigade in the trenches, and subsequently he fought at Weldon Road, in the operations north of James River and at Fort Fisher. He was elected comptroller general in 1876 and governor in 1880.

HAGUE, Cape of the. See Cap de la Hague.

HAGUE, hāg, Arnold (1840–). An American geologist, born in Boston. He graduated in 1863 at Sheffield Scientific School (Yale), studied at Göttingen, Heidelberg, and the Freiberg School of Mines, and in 1867 was appointed assistant geologist of the United States Geological Exploration of the Fortieth Parallel. From 1877 to 1878 he was government geologist of Guatemala, and from 1878 to 1879 government agent for the examination of mines in northern China. He was appointed a geologist of the United States Geological Survey in 1879 and in 1883 was assigned to the Yellowstone Park division. He was elected a member of the National Academy of Sciences in 1885 and was president of the Geological Society of America in 1910. His publications include: *The Volcanoes of California, Oregon, and Washington Territory* (1883); *The Volcanic Rocks of the Great Basin* (1884); *The Volcanic Rocks of Salvador* (1886); *Geology of the Eureka District* (1892); *Geology of the Yellowstone National Park* (1899); *Atlas of Yellowstone National Park* (1904); *The Origin of the Thermal Water in the Yellowstone National Park* (1911); *Geological History of the Yellowstone National Park* (1912).

HAGUE, George (1825–). A Canadian banker, born at Rotherham, Yorkshire, England, where he was also educated. He emigrated to Canada in 1854 and was for 20 years in the employ of the Bank of Toronto (1856–76), but afterward was general manager of the Merchants' Bank (1877–1902). He was first president of the Canadian Bankers' Association, of which he was one of the founders, and of the Montreal Good Government Association, a governor of McGill University, and of the Montreal Diocesan College. He gave liberally to many charitable institutions. Several of his papers on banking and kindred subjects have been published. He also wrote: *Personal Reminiscences of the Late E. H. King* (1896); *Canadian Banking; Free Thought and Kindred Topics; Some Practical Studies in the History and Biography of the Old Testament; Banking and Commerce* (1908).

HAGUE, hāg, The (Dutch *'s Gravenhage*, the count's hedge). The seat of the government of the Netherlands and residence of the sovereign, pleasantly situated in the Province of South Holland, about 15 miles northwest of Rotterdam and 3 miles from the North Sea (Map: Netherlands, C 2). It is intersected in all directions by canals and shaded avenues of linden trees and is famed above all other Dutch cities for its broad, handsome streets, palaces, government and municipal buildings, and stately houses. Of these edifices the picturesque town hall is the most interesting from an architectural standpoint. The most notable church is the Groote Kerk, or church of St. James, a Gothic structure of the fifteenth and sixteenth centuries, with a lofty hexagonal tower. The palace of justice is a handsome building in the Dutch Renaissance style. In the Mauritshuis, rebuilt in 1704, is located the renowned picture gallery, containing about 450 canvases, largely of the best Dutch period and especially rich in Rembrandts. Among the most celebrated pictures are Rembrandt's "School of Anatomy" and "Presentation in the Temple," Ruysdael's "View of Haarlem," Paul Potter's well-known "Bull," and Rubens's "Portrait of Ophovius." The municipal museum and the house of Baron Steengracht also have fine collections of paintings, the former containing corporation pieces by Ravesteyn.

The royal library possesses more than 500,000 volumes and a valuable collection of more than 40,000 coins and medals and over 300 cameos. In the centre of Willems-Park rises the magnificent national monument commemorating the restoration of Dutch independence in 1813. It was unveiled in 1869 and is surmounted by the "Nederlandsche Maagd"—the virgin personification of Holland. Other monuments are the equestrian statue of William I of Orange before the royal palace, and the bronze figure of Spinoza, erected opposite the house in which he lived. Still other museums and monuments merit attention.

The government buildings are handsome, and their archives include state papers over four centuries old. From an historic point of view the most interesting buildings of The Hague are the Gevangenpoort, or the prison gatehouse in which Oldenbarnevelt, the brothers De Witt, and many others distinguished in the history of Holland were confined; and the Binnenhof, in which Oldenbarnevelt was executed, and which, together with the Buitenhof, forms an irregular mass of public buildings of various ages, inclosed by moats and approached by drawbridges. These edifices are situated in the wealthy central quarter of the town around the attractive Vyver (fish pound)—an ornamental lake, with an island. The fish market is one of the most interesting in Europe. The suburbs are particularly beautiful with their meadows, gardens, woods, and villas. The so-called zoölogical and botanical garden is almost exclusively a pleasure park, and a fine road and five tramways lead to the celebrated watering place of Scheveningen on the coast. The far-famed royal villa of Huis ten Bosch (The House in the Wood), situated on the outskirts of the city in the midst of a noble and much frequented park forest (het Haagsche Bosch), has costly and dainty apartments filled with fine art objects and rare examples of interior decoration, including tapestries, embroideries, and grisailles. The Orange Room, an octagonal hall decorated with paintings by Jordaens and others, especially attracts the visitor. Consult *Guide to The Hague*, published by the Sixth International Congress of Navigation (The Hague, 1894), and Karl Baedeker, *Belgium and Holland* (15th ed., Leipzig, 1910).

The city is provided with good educational institutions, comprising public schools, a gymnasium, a drawing school, the Royal School of Music, and an educational institute of the Freemasons. There are many learned societies, the most notable being The Hague Society for the Defense of the Christian Religion, founded in 1785. Others are the Witte Society, the Physics Society, the artists' association called Pulchri Studio, and the Netherland-India Institute. The Hague is a residential city, conspicuous for fashionable life. Its prosperity depends chiefly on the court and nobility and on the throngs of foreigners that visit the city and Scheveningen. The manufactures are neither important nor varied, consisting chiefly of articles of luxury, such as gold and silver work and porcelain. There are some gun casting and brass and copper molding; and carriages and furniture are also manufactured. But little trade is carried on. In 1911 there were in the city 1393 factories and workshops subject to the factory laws; these had 15,814 employees. The city is the starting point of the railway system of Holland and has steam and electric trams. The Hague, like other Dutch towns, has increased rapidly in population. The figures were 81,393 in 1863; 212,211 in 1900 (including Scheveningen); 270,109 in 1910, and 294,693 in 1913. Two-thirds of the inhabitants are Protestants. The death rate is low; from 15.3 per thousand in 1904 it decreased to 12.5 in 1911.

The Hague was originally a hunting seat of the counts of Holland. Under William II (1250) it became a princely residence and prospered thereafter to such an extent as to become, in the sixteenth century, the seat of the States-General and of the Stadholder of Holland. In the seventeenth and eighteenth centuries The Hague was the diplomatic capital of Europe. Here were concluded the triple alliance of England, Sweden, and the Netherlands against France (1668) and the triple alliance of England, France, and Holland for the preservation of the Treaty of Utrecht (1717). Between May 18 and July 29, 1899, the city was the seat of The Hague Peace Conference (see Peace Movement). As a result of the conference, a Permanent Court of Arbitration was established, with a bureau at The Hague. A magnificent Palace of Peace, designed by the French architect L. M. Cordonnier, has been erected to house the Arbitration Court, Mr. Andrew Carnegie contributing $1,500,000 towards the expenses of construction. Another conference was held at The Hague in 1907. Curiously enough, The Hague possessed no municipal rights till the time of Louis Bonaparte, having remained for centuries the most magnificent "village" in Europe. In 1909 the municipal revenues amounted to 19,140,000 florins and the expenditures to 17,049,000 florins. At the end of that year the municipal debt was 43,508,300 florins, or about $17,500,000.

HAGUE PEACE CONFERENCE. See Peace Movement.

HAGUE TRIBUNAL. See Peace Movement.

HAHN, hän, August (1792–1863). A German Protestant theologian. He was born at Grossosterhausen, Saxony, March 27, 1792, studied at Leipzig, and in 1819 was appointed professor extraordinary of theology at Königsberg and edited some of the Syrian church fathers. In 1826 he removed as professor of theology to Leipzig, where he came into great prominence as the author of a treatise, *De rationalismi, qui dicitur, vera indole et qua cum naturalismo contineatur ratione*, and also of an *Offene Erklärung an die evangelische Kirche zunächst in Sachsen und Preussen*, in which he endeavored to convince the rationalists that it was their duty at once to withdraw from the national church. In 1833 Hahn was called to Breslau as theological professor and consistorial councilor, and in 1844 he became general superintendent of the Province of Silesia. He edited the Hebrew Bible (1831) and wrote, among other works, *Bibliothek der Symbole und Glaubensregeln der apostolischkatholischen Kirche* (1842; 2d ed., by G. L. Hahn, 1878).

HAHN, Carl von (1848–). A German-Russian explorer and educator. He was born at Friedrichstal, near Freudenstadt, and was educated at Tübingen. In 1872 he became tutor to the family of the Grand Duke Michael, Governor-General of the Caucasus, in 1874 entered the Russian service, in 1896 was ennobled and became director of the first Russian secondary school in Tiflis. He wrote important books on the Caucasus in German and Russian, notably *Aus dem Kaukasus* (1892); *Kaukasische Reisen und Studien* (1896); *Bilder aus dem Kaukasus* (1900); *Erster Versuch einer Erklärung kaukasischer geographischer Namen* (1910); *Neue kaukasische Reisen und Studien* (1911).

HAHN, Friedrich von (1823–97). A German jurist, born in Hamburg. He became a lecturer at Jena in 1850 and professor in 1862. In the conferences held at Nuremberg and Hamburg in connection with a general code of commercial law for Germany, he took a prominent part. He was appointed to the Court of Appeal at Jena in 1862 and to the Supreme Court of the Empire in 1879. From 1891 until his retirement in 1893 he was president of the Senate of the Supreme Court. His chief publication is his *Kommentar zum allgemeinen deutschen Handelsgesetzbuch* (Brunswick, vol. i, 4th ed., 1894; vol. ii, 4th ed., 1881–83).

HAHN, Johann Michael (1758–1819). A Swabian Theosophist, founder of the Michelians, numerous in Württemberg. He was born at Altdorf and had visions at the age of 17, and again in his twentieth and twenty-second years. After the last of these he began to proclaim his beliefs, both by writing and by speech, and gained many followers. But neither he nor they became Separatists. In 1782 he traveled to Switzerland and met Lavater, Pfenninger, and Jung-Stilling. Unlike most of the visionaries of his country, Hahn held that regeneration was a slow growth. His views were largely tinged with the teachings of Böhme and of Oetinger. He held the belief in a double fall of man; the mystic belief that the work of Christ is not merely for but within man; and the millennial view of the second advent, and of the final beatitude of all souls, even of the fallen angels. His works were published posthumously at Tübingen (1819 et seq.). Consult Palmer, *Die Gemeinschaften und Sekten Württembergs* (Freiburg, 1877), and Staudenmeyer, *Michael Hahn* (Wilferdingen, 1893).

HAHN, Ludwig (1820–88). A German historian, born at Breslau and educated there and at Berlin. After several years of service as private tutor in Paris, as assistant in the department of education at Breslau, and as a school official at Stralsund, he became chief counselor of the government in the literary bureau, and retired in 1883. He wrote: *Das Unterrichtswesen in Frankreich* (1848); the very popular *Geschichte des preussischen Vaterlands* (24th ed., 1895) and *Leitfaden der vaterländischen Geschichte* (5th ed., 1904); *Friedrich der Grosse* (2d ed., 1865); *Kurfürst Friedrich I. von Brandenburg* (1859); *Zwei Jahre preussisch-deutscher Politik, 1866–67* (1868); *Der Krieg Deutschlands gegen Frankreich* (1871); *Kaiser Wilhelms Gedenkbuch* (5th ed., 1880); *Fürst Bismarck*, a collection of speeches, state papers, letters, etc., of the Chancellor (1878–91, the fifth and last volume by Wippermann); *Zwanzig Jahre 1862–82*, a study of Bismarck's influence (1882); *Wilhelm, der erste Kaiser des neuen deutschen Reichs* (1888).

HAHN, Reynaldo (1874–). A French composer, born at Carácas (Venezuela). In 1885 he entered the Paris Conservatory, where he studied under Dubois, Lavignac, and Massenet, who took a special interest in him. His works include a symphonic poem *Nuit d'amour bergamasque*, excellent incidental music to Daudet's *Obstacle*, Croisset's *Deux courtisanes*, Mendès's *Scarron*, Racine's *Esther*, and Hugo's *Angelo;* the operas *L'Ile du rêve* (1898) and *La Carmélite* (1902); a ballet *Fête chez Thérèse* (1910). His songs and piano pieces enjoy great popularity and are among the sanest and most characteristic of modern French compositions.

HÄHNEL, hā'nel, Ernst (1811–91). A German sculptor, born at Dresden. He studied architecture there and, from 1830, at Munich. Under the influence of Schwanthaler and Rietschel, he turned his attention to sculpture, which he also studied at Rome. In 1838, through the architect Semper, he received a commission to supply sculptures for the Royal Theatre of Dresden. The most important of these, a frieze representing a "Bacchanalian Procession," was destroyed when the theatre was burned, but survives in plaster cast, and the statues of Sophocles, Aristophanes, Shakespeare, and Molière were saved and used on the new building. For the Dresden Museum he executed many reliefs and six statues in sandstone, the most famous being a Raphael, of which there are marble replicas in the National Gallery, Berlin, and the Leipzig Museum. His best-known works include a bronze statue of Beethoven at Bonn (1845), the colossal statue of Charles IV at Prague (1848), the bronze image of Frederick Augustus II at Dresden (1867), and Field Marshal Schwarzenberg at Vienna (1867). For Leipzig he executed a bronze statue of Leibnitz (1883) and a group, "Eve Protecting Abel from Cain"; for the Vienna Opera House, five ideal statues; and the two admirable Pegasus groups. Although Hähnel's tendencies were classical, his portrait statues and busts evince high power of characterization. His art represents a transition from the Classical to the Romantic school. As professor at the Dresden Academy, he had many pupils. His works have been published in photographic reproduction (Dresden, 1882–87).

HAHNEMANN, hä'ne-màn, Samuel (1755–1843). The founder of homœopathy. He was born at Meissen, Saxony, the son of a painter of Dresden china. After obtaining a primary education with difficulty, at the age of 20 he left Meissen, with 20 crowns as his fortune, and went to Leipzig, to prosecute his medical studies. Here he maintained himself by translating works from Latin, French, and English into German. Two years later he went to Vienna, where, under the direction of Dr. Quarin, he pursued his studies, but a year afterward was obliged to seek funds through employment as physician and librarian at Hermanstadt. He was graduated in medicine from the University of Erlangen in 1779. Subsequently he retired to Saxony and settled in Dresden in the year 1784. His attention at this time was given to the study of the toxicology of arsenic and of mercury. After spending four years in Dresden, where he had for a time the direction of a large hospital, he returned in the year 1789 to Leipzig. In the following year, while translating Cullen's *Materia Medica* from English into German, he became interested in the similarity of the effects of quinine and some other drugs upon the healthy body with the result of certain diseases for which these drugs are used. In other words, he discovered independently Hippocrates' old "law of similars." With intense interest he searched medical literature for confirmation of his belief in a new principle of cure which he at once began to advocate, viz., that drugs which produce certain symptoms in the healthy body will cure a disease which exhibits similar symptoms. In *Hufeland's Journal*, in 1796, he published his first important paper, entitled "An Attempt to Find a New Principle for the Discovery of the Healing Power of Medicine, with Observations on Existing Methods." About 1800 he promulgated the principle of "potentization" or "dynamization" of drugs, by trituration of minute amounts of dry drugs with inert material, or dilution and vigorous shaking of minute quantities of liquid drugs, claiming for such preparations increased strength from the new arrangement of molecules. "Dynamization," he claimed, imparted a spirit-like force to the dose. In 1810 Hahnemann published his *Organon der rationellen Heilkunde*, which was translated into many languages, and in which he expounded his new system, which he called *homœopathy.* Between 1810 and 1821 he published, at Leipzig, his *Materia Medica*, under the name *Reine Arzneimittellehre*, in six volumes. In this work he set forth his observations of the effects of drugs upon healthy people. About the same time he founded at Leipzig a school which soon attracted students from all over the country. In 1828, in his work on chronic diseases, written at Köthen, he discussed the disease known as the itch and reached the conclusion that all diseases are modifications of the itch. The discovery that the itch insect, *Sarcoptes scabiei* (*Acarus scabiei*), is the cause of scabies beyond a doubt, caused a change in the belief of homœopathists all over the world, and an abandonment of what had been called the first principle of homœopathy.

As Hahnemann's system involved the administration of medicines each by itself and in minute doses, there was no longer any need of the apothecary's intervention between the physician and the patient. In consequence of this, the apothecaries' company brought to bear upon Hahnemann an act forbidding physicians to dispense their own medicines, and with such effect that he was obliged to leave Leipzig. The Duke of Anhalt-Köthen appointed him his physician and invited him to live at Köthen. Thither, accordingly, he removed in the year 1821, and there he prepared various new editions of his *Organon* and new volumes of his *Materia Medica* for publication. In 1835 he left Köthen and settled in Paris, where he enjoyed a great reputation till his death, which took place in the year 1843. On the centenary of his birth, in 1855, a statue was erected to his honor at Leipzig, at the expense of his disciples in Germany, France, England, and other countries, with the concurrence of the local authorities, who supplied the site in one of the public places in their handsome town. His principal work, besides those already mentioned, is *Fragmenta de Viribus Medicamentorum* (1805). Consult his *Life and Letters*, by Bradford (Philadelphia, 1895). See HOMŒOPATHY.

HAHN-HAHN, hän′hän, IDA, COUNTESS VON (1805–80). A German novelist, born at Tressow. Her unhappy married life and divorce (1829) are reflected in her *Ulrich* (1841) and *Zwei Frauen* (1845), written under the influence of the emancipatory ferment of Gutzkow, Laube, and Heine, and the early novels of George Sand. She became a Roman Catholic in 1850, wrote several proselytizing books, became a novice (1852), took part in the founding of a convent at Mainz, and died there. Her clever but superficial talent had great though passing vogue, during which several of her books were translated into English. For her life, consult: Marie Helene (Leipzig, 1869); Haffner (Frankfort, 1880); Alinde Jacoby (Mainz, 1894).

HAHNKE, hän′ke, WILHELM VON (1833–1912). A German soldier, born in Berlin. He received his military training as a member of the Prussian cadet corps, entered the Prussian army in 1851, and in 1866 was on the staff of the Crown Prince, Frederick William, during the campaign in Bohemia. During the Franco-Prussian War he was a major on the general staff, in the headquarters of the Crown Prince, and by 1881 had risen to be major general, commanding the first brigade of infantry guards. In 1890 he became general of infantry, from 1888 to 1901 was chief of the military cabinet, in 1899 was appointed commander in chief in the Marches and Governor of Berlin, and in 1905 became general field marshal. In 1907 he received the order of the Black Eagle and in 1909 was made Governor of Berlin.

HAIDA, hī′dä. A remarkable group of tribes constituting the Skittagetan linguistic family, formerly occupying the 39 villages on the Queen Charlotte Islands, British Columbia. They are a seafaring people, traveling and fishing in large canoes, hewn from logs of cedar, carved with symbolic figures. The women are skillful in weaving mats and baskets in twined work, and the men in carving from black slates miniature figures of their totemic designs, totem posts, house fronts, and articles of daily use. They were a warlike race and extended their raids along the coast as far as the mouth of the Columbia River. Their houses are built of cedar planks hewn out, and in front of each immense totem poles have carved on them the heraldic emblems of the family dwelling within. Women and men tattoo their bodies and wear labrets. The contact with civilization has reduced the population from 7000, in 1840, to 530, living in Masset and Skidegate villages. Consult: Swanton, *Haida Texts and Myths* (Washington, 1905); *Contributions to the Ethnology of the Haida* (New York, 1905–09); id., *Haida Texts* (ib., 1908); id., *Haida Songs* (Leyden, 1912).

HAIDARABAD, hī′dẽr-ȧ-bäd′. A native state and a city of British India. See HYDERABAD.

HAIDEE, hī-dē′. A Greek girl in Byron's *Don Juan*.

HAIDEE, MADEMOISELLE. See AÏSSÉ.

HAIDINGER, hī′dĭng-ẽr, WILHELM VON (1795–1871). An Austrian mineralogist, geologist, and physicist. He was born at Vienna and studied with Mohs at Graz and at Freiburg. After living for a time in Edinburgh he returned to Austria, where he was interested with his brother in a porcelain factory at Elbogen. In 1840 he was appointed to take charge of the Imperial Mineralogical Collections at Vienna, and a few years later he commenced his lectures on mineralogy. In 1849 he was chosen as the director of the newly founded Geological Institute, and in 1865 he was knighted. He published many books on mineralogy and crystallography, but is best known perhaps for the discovery of the phenomenon known as *Haidinger's brush*, by means of which plane polarized light can be detected. This consists of a pale-yellow brush with curved arcs on either side, shaped like the branches of a hyperbola. The plane of polarization coincides with the axis of the brush, and on either side there is a violet or bluish patch. This phenomenon is supposed to be caused by the polarizing structure of the eye. While in Edinburgh, Haidinger translated Mohs's *Grundriss der Mineralogie* and then published it in enlarged and improved form under the title of *Treatise on Mineralogy* (3 vols., 1825). In addition to many volumes and papers on mineralogy and other allied departments of science, Haidinger is the author of *Handbuch der bestimmenden Mineralogie* (1845) and supervised the construction of a geological map of the Austrian Empire (1845).

HAIDUKS, hī′dụks (Hung. *hajdu*, drover, pl. *hajduk*). A term formerly applied among the Balkan Slavs to the bandit mountaineers, who, like the Greek *klephts*, were generally Christians and opposed to Turkish rule. Such bands—each one having a chief, the *haram basha*—were found among the Serbs and Bulgarians from the beginning of Turkish rule. Those who killed Turks only were regarded by their people as patriots rather than as bandits. They were popular heroes and did much to bring on the final struggle for independence. In Hungary this designation was applied to a class of mercenary magyar foot soldiers. As a reward for their services in the struggle against the Hapsburgs, Stephen Bocskay, Prince of Transylvania, granted them, in 1605, the privileges of nobility and a large stretch of territory as their own possession. The Haiduk district remained independent of the local authorities, and under the direct administration of the national government, until after the revolution of 1848. Haiduks adopted Calvinistic Protestantism early in the Reformation. In 1876 this district was enlarged by incorporating portions of two adjoining districts into a new administrative division known as the Haiduk County, with Debreczin for its capital. In Hungary and Poland the term is also applied to the domestics of the great houses. In France in the eighteenth century it was given to the outriders of the carriages of the rich. These outriders wore Hungarian costumes and carried swords until prohibited by royal ordinance, in 1779, from bearing this mark of military rank. The names of several Hungarian towns have "Haiduks" as a prefix. Consult Rosen, *Die Balkanhaiduken* (Leipzig, 1878).

HAIFONG. See HAIPHONG.

HAIGHT, hāt, CHARLES COOLIDGE (1841–). An American architect and sculptor. He was born in New York City and in 1861 graduated from Columbia College (A.M., 1864). In 1862–64, during the Civil War, he was a captain of United States Volunteers. He became a member of the National Sculpture Society, of the Architectural League, and of the American Institute of Architects. In 1906 he received the honorary degree of A.M. from Yale University.

HAIL (AS. *hagol*, Icel. *hagl*, OHG. *hagal*, Ger. *Hagel*, hail; probably connected with Gk. κάχληξ, *kachlēx*, pebble). Round, compact masses of ice that fall from the clouds to the earth, usually with rain. When these masses are as large as ¼ of an inch in diameter or larger, they are often spoken of as hailstones; when they are quite small and perhaps accompanied by rain, they are known as sleet. Hailstones occur of all sizes from ¼ of an inch in diameter up to 3 inches in diameter; usually comparatively few hailstones fall at any one place, but cases are recorded in which the ground has been covered to a depth of several inches and all vegetable life destroyed. The larger hailstones have a rather complex structure, being mostly composed of concentric layers of solid transparent ice and snowy-white or soft ice. In most cases the larger stones have a nucleus, which is either a foreign substance, such as a bit of gravel or a small pebble, or some larger object, such as those that are carried up from the earth by tornadic winds; or the centre is composed of a mass of snow, in whose interstices is held some gas, presumably air or oxygen, powerfully compressed within the central cavity. When this cavity is opened under water, the inclosed gas is seen to expand, and, according to Jaentr, the gas seems to be held therein under a pressure of as much as 50 atmospheres.

The external surface of a hailstone is sometimes of beautiful regularity, as though it had grown by accretion of small particles during a slow and steady motion through the atmosphere, but this regularity is quite rare. More frequently the larger stones are irregular aggregations of masses of ice; of course, however, such masses may have their shapes greatly altered when they strike the ground. The largest stones whose records are trustworthy have not exceeded two pounds in weight. Stones of 2 and 3 inches in diameter, weighing 12 and 16 ounces, occur annually in Europe, India, and America. Consult the *Monthly Weather Review* for August, 1878.

A hailstorm is usually characterized by the formation of very high cumulus clouds, strong surface winds, considerable lightning and thunder, and heavy rain. It appears possible that hail may be formed either in the front of an advancing cool wave or in connection with a local thunderstorm or tornado. The former gives us the smaller hail and sleet; the latter gives us the larger and destructive hailstones. In the latter case it is quite common for the area of destructive hail to cover long, narrow strips of country as though it belonged on one side of the path of progression of some special cloud or vortex.

Protection against hail has been sought from time immemorial by different methods characterized by the gradual progress of our knowledge as to how hail is formed. In most ancient days the church bells were rung and the saints invoked. The lightning rod is called *paragrêle* in France, and in recent years elaborate gigantic installations called "electric niagaras" have been erected there as protection against hail. The Bureau Central Météorologique has shown very clearly that no form of lightning rod has any effect upon the formation of hail. (Consult Angot in *Monthly Weather Review* for March, Washington, 1914.) More recently the belief and practice of the peasants of Styria and northern Italy spread through Austria and southern France to the effect that a special form of cannonading may, by bombarding the clouds, prevent hail, the theory being that if hail is formed by a process of crystallization in still air, then the cannonading by disturbing the stillness would prevent the hail. But all these ideas are delusions, and the bombardment has no appreciable effect upon the hailstorms. (Consult an elaborate and convincing report by Pernter in *Meteorologische Zeitschrift* for March, Brunswick, 1907.) The most rational method of counteracting the injury done by hail is by adopting a method of hail insurance by which the losses of a few persons are distributed among many. The total amount of damage done by hail and lightning is summed up statistically in the annual reports of the Chief of the Weather Bureau and in the special reports in the *Monthly Weather Review*.

The method of formation of hail is as yet but little understood. It seems to be demonstrated that when a rising mass of air cools to the dew point and below, it begins to form a cloud; as it continues to ascend, it cools to a temperature where hail is formed or rather hail and rain simultaneously. Higher than this it cools to a temperature where snow is formed. The ordinary hail may be formed in the second region, but the large hailstones of complex structure must have been carried up and down many times from the rain region to the snow region forward and backward until they become too large and heavy to be held up any longer. In accordance with these ideas it is found that a very large proportion of the destructive hail occurs between 10 A.M. and 4 P.M., and a very small proportion between 6 P.M. and 8 A.M. Consult Von Bezold, *Thermodynamics of the Atmosphere* (originally published at Berlin, 1888 and 1889; translated in full in Abbe, *Mechanics of the Earth*, Washington, 1891), and Ferrel, *Recent Advances in Meteorology* (ib., 1886).

In the *Monthly Weather Review* for September, 1900, is given a table showing the annual frequency of hailstorms for a unit area of 100 miles square, as derived from the records of each State in the Union. In addition to the table, records made in the States of Connecticut, Rhode Island, Massachusetts, Maryland, Delaware, and in the District of Columbia, may be summed up into one average—i.e., 3.0 per cent. This table is as follows:

Alabama	3.96
Arizona	1.99
Arkansas	5.08
California	2.54
Colorado	5.92
Florida	2.10
Georgia	3.39
Idaho	4.26
Illinois	8.44
Indiana	9.84
Indian Territory	2.58
Iowa	8.44
Kansas	6.28
Kentucky	7.16
Louisiana	5.04
Maine	1.84
Michigan	5.64
Minnesota	4.48
Mississippi	4.62
Missouri	8.78
Montana	1.78
Nebraska	5.78
Nevada	2.62
New Hampshire	2.68
New Mexico	1.98
New York	6.30
North Carolina	5.22
North Dakota	3.82
Ohio	10.74
Oklahoma	3.74
Oregon	4.30
Pennsylvania	6.18
South Carolina	5.72
South Dakota	4.06
Tennessee	5.70
Texas	1.44
Utah	3.06
Vermont	6.40
Virginia	6.36
West Virginia	7.94
Wisconsin	6.28
Wyoming	1.16

HAIL COLUMBIA. A song written in 1798 by Joseph Hopkinson for the benefit of a young actor and sung to the tune of the *President's March* (1788), composed by Fyles in honor of President Washington. Though not of a high order, it appealed to the popular taste and continues to maintain its position as one of the representative patriotic songs of the United States.

HAILES, Lord. A Scottish judge and writer. See Dalrymple, David.

HAI′LEYBURY. Chief town in Timiskaming District, Ontario, Canada, on Lake Timiskaming and on the Timiskaming and Northern Ontario Railway, 107 miles north of North Bay (Map: Ontario, K 9). It is the seat of a Roman Catholic bishop and has a general hospital. Its industrial establishments include saw mills and a brickyard. The town owns its water and sewerage systems. Pop., 1911, 3874.

HAILEYBURY COLLEGE. An English public school situated at Hailey, Hertfordshire, 19 miles north of London. This school is often called New Haileybury, in distinction from the older and more famous school which it succeeded. **Old Haileybury,** or more properly the East India College, was a training school for young men entering the service of the East India Company. It was founded by the company in 1806 and, occupying first Hertford Castle, moved to the building erected for it at Hailey by Wilkins in 1809. Here it carried on its work till, after a career of almost exactly half a century, it ceased to exist (Jan. 31, 1858). During that time many of the most distinguished men connected with Indian history and administration were members of the college. Among the professors are to be found the names of Malthus, the political economist; Sir James Stephen, Sir James Mackintosh, and William Empson, master of the college and later editor of the *Edinburgh Review.* Lord Lawrence, Sir Bartle Frere, Sir Charles Trevelyan, Sir William Muir, John Muir, Dean Merivale, Sir Richard Temple, and Sir M. Monier-Williams may be instanced among its students. The great days of the school seem to have been in the principalship of Dr. Batten (1815–37), when many of those most famous in the Mutiny days were in Haileybury. It was indeed in that trying time that the value of the school and its training was best seen, and the proud tradition of the school is the part its men took in the suppression of that rising. Its importance rests on even broader grounds than this. In the influence it has had on Indian administration by its spirit and traditions; in the model which it set for the training of men for both Indian and colonial service, now carried on elsewhere; in the impetus it gave to Oriental studies in England, as well as in the vigorous and varied intellectual life it enjoyed during the greater part of its career—the East India College deserves a high place among English educational forces of the nineteenth century. The fall of the East India Company after the Sepoy Mutiny brought with it the suspension of its great training school. The Indian Civil Service was reorganized under government control, and the training of men for that service fell into other hands. For some four years the buildings at Haileybury stood vacant.

New Haileybury. Owing to the exertions of certain gentlemen of Hertfordshire, chief among whom was the publisher Stephen Austin, of Hertford, a sum was subscribed to buy the estate and found a public school on the premises. This was accordingly done, and the school was incorporated by royal charter and was opened in September, 1862, as Haileybury College. This foundation, beginning with an enrollment of some 50 scholars, was successful from the start. The estate has increased from the original 55 acres of the East India College to nearly double that area; the number of students has grown to 500, all boarders, and many new and handsome buildings have been added to the great quadrangle of the old school. Of that earlier foundation more has been inherited by the new than the estate and buildings; for while it is no longer a training school for the Indian service, much of the old atmosphere and tradition remains, giving it a tone and character which mark it off to some extent from other schools. The school is conducted on the usual lines of an English public school. For the East India College, consult Monier-Williams, *Memorials of Old Haileybury College* (Westminster, 1894); for the new school, consult L. S. Milford, *Haileybury College, Past and Present* (London, 1909). A. L. Lowell, *Colonial Civil Service* (New York, 1900), devotes more than 100 pages to Haileybury College to show its value in securing good and fit men for colonial offices.

HAILLAN, ȧ′yäɴ′, Bernard de Girard du (c.1535–1610). A French historian, born in Bordeaux. He occupied a number of political offices before Charles IX appointed him historiographer of France, in which position he was confirmed by Henry III, who liked him so well, despite his vanity and selfishness, that he made him genealogist of the Order of the Holy Ghost and gave him a pension of 1200 crowns. His chief work is *L'Histoire générale des rois de France jusqu'à Charles VII inclusivement* (1576), which ran through many editions.

HAILMANN, hāl′mȧn, William Nicholas (1836–). An American educator, born in the Canton of Glarus, Switzerland. He studied in the Gymnasium at Zurich, Switzerland, and in 1855 entered the Medical College at Louisville, Ky. Between 1856 and 1883 he taught in, or was director of, several American secondary schools; thereafter he was in succession superintendent of public schools at La Porte, Ind., National Superintendent of Indian Schools (1894–98), superintendent of instruction at Dayton, Ohio, head of the department of psychology, Chicago Normal School (1904–08), and professor of the history of education at the Cleveland Normal Training School. His publications include: *Outlines of a System of Object*

Teaching (1866); *History of Pedagogy* (1870); *Kindergarten Culture* (1872); *Letters to a Mother* (1876); *Early Education* (1878); *Primary Helps* (1884); *Primary Methods* (1887); *Application of Psychology to Teaching* (1887); *Place and Development of Purpose in Education* (1899). He also translated Fröbel, *The Education of Man* (1890); and edited the *Erziehungsblätter* (1870–83), *The Kindergarten Messenger and New Education* (1876–83), *The English Language* (1902).

HAIL TO THE CHIEF. The boat song occurring in the second canto of Scott's *Lady of the Lake.* The air, by Sir Henry Rowley Bishop, is frequently played on public occasions to announce the approach of a person of prominence.

HAILTZUK, hīl′tsụk. A group of tribes of Wakashan stock, occupying the coast islands of British Columbia from Gardner Channel to Rivers Inlet. The chief tribes are the Bellabella, China Hat, Nohuntsitk, Somehulitk, and Nikeno. In language and customs they are almost identical with their neighbors and kinsmen, the Kwakiutl (q.v.).

HAIMBURG, hīm′bụrᴋ. See HAINBURG.

HAIMO, or **HAYMO,** hī′mō (c.778–853). An Anglo-Saxon ecclesiastic, Bishop of Halberstadt. A monk at Fulda, Haimo taught at Hersfeld and in 840 became Bishop of Halberstadt. His friend and fellow student, Rabanus Maurus (q.v.), wrote him a book of advice in his new office, *De Universo.* He was scholarly and spiritual, fond of allegory and mysticism. His works, mostly commentaries on the Scriptures, are published under the designation "Haymon Halberstatensis," in vols. cxvi–cxviii of Migne, *Patrologia Latina* (Paris, 1844).

HAIMONSKINDER, hī′mōns-kĭn′dẽr. A popular German romance which appeared at Cologne in 1604 under the title *Ein schöne und lüstige Histori von den vier Heymonskindern.* It was largely an adaptation of a version current in the Netherlands and based on a French original. A previous German adaptation (1535) was based directly on the prose romance *Les quatre fils Aymon.* Consult L. Jordan, *Die Sage von den vier Haimonskinder* (Erlangen, 1905). See AYMON.

HAIM′SUCKEN, or **HAMESUCKEN** (from AS. *hām*, Goth. *haims*, OHG. *heim*, Ger. *Heim*, home + AS. *saeu*, contention, guilt, lawsuit, from AS., Goth. *saean*, OHG. *sahhan*, to contend). A Scottish law term, denoting the offense of feloniously assaulting a man in his own house or lodgings. This is an aggravation of the ordinary offense of assault and involves severer punishment. English and American law make no distinction based on the place where an assault is committed. The term was, however, employed in early English law to describe the offenses comprehended under the term "housebreaking." See BURGLARY.

HAINAN, hī-nän′. A large island in the China Sea, situated south of China and forming a department of the Chinese Province of Kwangtung (Map: China, J 8). Its area is estimated at 16,000 square miles. It is separated from the mainland by Hainan Strait, 10 miles wide. There are several densely wooded mountain chains in the interior, with rich valleys between. The coasts are level and well watered, and the chief rivers are navigable for flatboats. The flora is very abundant and includes the areca palm, coconut tree, the banana tree, and various other tropical plants. Among the fauna are the tiger, rhinoceros, wild hog, deer, and several species of monkey. The climate is hot, but somewhat tempered on the coast by the wind. Earthquakes are very frequent. The chief products are sugar cane, cotton, tobacco, coconuts, and coconut products. The population of the island is estimated at 2,000,000, consisting partly of Chinese along the coast, whose immigration to the island began in 1370 (when it was incorporated in the Province of Kwangtung), and the aborigines. The latter resemble somewhat the Malays and are of small stature and far from prepossessing in appearance. They live a very primitive life, and as they solely inhabit the almost unknown interior, they are practically independent. The capital of Hainan is the city of Kiungchow; pop., over 50,000. Its seaport is the treaty port Hoihow, 3 miles distant; pop., about 36,000. Imports for 1912 amounted to Hk. Tls. 2,952,981. Exports (1912, Hk. Tls. 2,390,670) consist mainly of pigs, poultry, eggs, and provisions. (Haikwan Tael = $0.721.) There are few resident foreigners.

HAINAULT, or **HAINAUT,** å′nō′ (Flem. *Henegourven*). A western province of Belgium, lying southeast of Flanders (Map: Belgium, B 4). Its area is 1437 square miles. The province may be said to belong to the region of the Ardennes and is well watered by the Scheldt, the Sambre, and their tributaries. The canals are numerous. The soil is very fertile, and agriculture flourishes. Wheat, flax, and fruits are principally grown. Horse breeding is an important industry. Hainault is very rich in coal deposits, yielding about three-fourths of the total output of Belgium. Over 96,000 people are employed in the coal mines. Iron, marble, and plaster are also exported, and the production of pig iron, steel, and glass is extensive. The textile manufactures are likewise well developed. More than one-half of the population are occupied industrially. The inhabitants numbered 807,467 in 1895, 1,232,867 in 1910, and (est.) 1,247,242 in 1912, being one of the most densely populated districts in Belgium, having over 850 inhabitants to the square mile. The capital is Mons. Hainault was a county in the latter part of the Middle Ages. Together with the County of Holland, it was made over to Burgundy by Countess Jacqueline in 1433. Subsequently it shared the fortunes of the Belgian Netherlands. Portions of it were annexed to France in the seventeenth century.

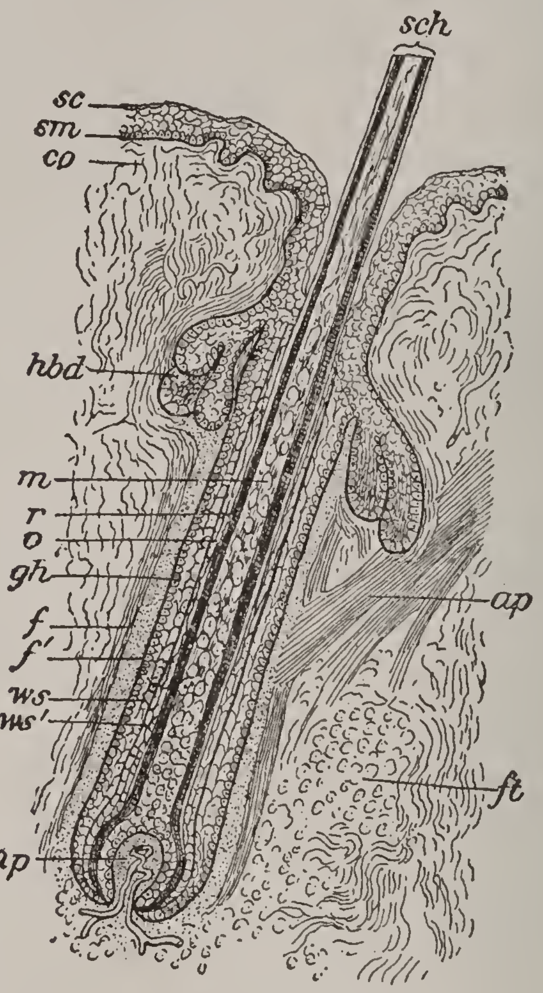
HAINBURG, hīn′bụrᴋ, or **HAIMBURG,** hīm′bụrᴋ. An ancient town in Lower Austria, situated on the right bank of the Danube, 38 miles east-southeast of Vienna (Map: Austria-Hungary, E 2). It is surrounded by old walls and abounds in Roman antiquities, though the main part of the town has been rebuilt since the fire of 1827. It is supplied with water by an ancient aqueduct; the Rathaus contains a Roman altar. The old ruined castle is identified with the castle of Heimburc, mentioned in the *Nibelungen* as the border fortress of the Huns. Outside of the town lie the ruins of the castle of Rottenstein. Hainburg has a military engineering school, one of the largest Imperial tobacco factories of Austria (2300 hands), a needle factory, and a saw mill. The town was destroyed by Matthias Corvinus in 1482 and by the Turks in 1683, when most of the inhabitants were killed. Pop. (town), 1900, 6225; (district), 1910, 15,200.

HAINES. An incorporated town on Lynn Canal, Alaska, adjoining Fort William H. Seward. It has a Presbyterian mission and hospital. The inhabitants, numbering 445 in 1910, live largely by fishing, supplying adjacent canneries.

HAINES, or **HAYNES,** Joseph (?–1701). An English actor and writer. After completing his studies at Queen's College, Oxford, he was for a time secretary to one of the ministers of state, but was soon dismissed because of indiscretion, and became a dancer on the stage. He played Benito in the *Assignation*, a part which it is supposed Dryden wrote expressly for him, but his fame rests principally upon his ability in reciting prologues and epilogues, many of which were from his own pen.

HAIPHONG, or **HAIFONG,** hī'fông'. The chief port of Tongking, opened in 1876 to foreign residence and trade under a treaty made by the French with the King of Annam (Map: French Indo-China, E 2). It is situated on the right bank of the Kua-Kam, a branch of the Songkoi (or Red River), at a point where a canal leads out of it at right angles towards the Songkoi. The banks of the river are low and of alluvial mud, from which the city was reclaimed at tremendous expense and labor. It is the port of Hanoi, the capital of Tongking, distant 145 miles by water, but only 60 in a direct line. Entrance to the port is obstructed by two bars, the outer one of sand and the inner of mud; formerly accessible only to vessels drawing up to 18 feet, it now can accommodate them up to a draft of 24 feet. Ships anchor about ¼ of a mile from the town, in 40 to 60 feet of water. The harbor has a small dock, some fine wharves, and godowns. In 1912, 397 vessels of 460,000 gross tons entered the port. The town lies on both sides of the canal, in the midst of a rice swamp extending around it for miles. The native town consists of houses of mud, bamboo, and matting. Previous to the arrival of the French there was scarcely a hut. On the other side of the canal is the "Concession," or French settlement, with broad streets lined on both sides with trees and lighted with electricity, a fine boulevard, good houses, spacious warehouses, extensive shops, many pleasant bungalows, and a hotel, theatre, church, public garden, and race course, all erected on swampy land filled in with mud dug from the creek which surrounds it. It has the appearance of a prosperous and clean city. A cotton mill with 25,000 spindles employs over 600 persons. The city is connected with Saigon by cable. Haiphong is the highest point to which vessels drawing 14 feet can ascend. There are several newspapers published. The railway to Hanoi was opened February, 1901, and there is a regular service of river steamers communicating with that city. Population numbers about 18,500, which includes about 1000 Europeans, 5500 Chinese, and 12,000 Annamites.

HAIR (AS. *hŭr*, Icel., OHG. *hær*, Ger. *Haar;* probably connected with OChurch Slav. *kosmā*, Lith. *kasa*, hair, and perhaps with Lat. *carere*, to card wool). The characteristic covering of mammals, an epidermal outgrowth, the formation and structure of which are quite different from either scales or feathers. Hairs are not entirely wanting in any mammals, though they vary greatly in abundance, some animals being completely and densely clothed in them, while others possess them only on limited parts of the surface, as in man, and others, as adult whales, have only a few bristles near the mouth. Hairs of two distinct kinds occur in many mammals—one of which is stiff, straight, and smooth; the other curly, soft, and often minutely rough. It is this roughness of the outer surface which makes the processes of felting and skinning possible. When both kinds of hairs are present, the soft ones, usually called "wool," are much more abundant than the straight ones; but the latter give the smooth outer coat to the body and are therefore sometimes called "contour" hairs. Unlike feathers, hairs are uniformly distributed over the body, except in special cases, where particular regions are left bare. Hairs vary greatly in size and color; the longest hairs occur among the ungulates, especially in the tails of such species as the horse, while the shortest hairs of any mammal are usually on the face. In man the shortest hairs are found upon the eyelids, where they barely project above the follicles containing them. The color of hairs depends upon the amount of pigment they contain, the amount of air in the intercellular spaces, and the character of the external surface.



GROWTH OF A HAIR.

Diagrammatic longitudinal section through the "root" of a hair. *sc*, Stratum corneum; *sm*, stratum Malpighii; *co*, derma; *ap*, arrectores pili; *ft*, adipose tissue; *f*, outer longitudinal layer, and *f'*, inner transverse layer, of dermic coat (both composed of connective tissue); *sch*, hair shaft; *m*, medulla; *r*, cortex; *o*, cuticle of shaft; *ws*, external root sheath; *ws'*, internal root sheath, which reaches above only as far as the point of entrance of the ducts of the sebaceous glands; *hbd*, sebaceous glands; *hp*, hair papillæ containing vessels; *gh*, hyaline layer which lies between the inner and outer hair sheaths, *i.e.*, between the root sheath and the follicle. (Wiedersheim.)

Hairs arise as outgrowths of the epidermis and contain no dermal tissue. The original epidermal thickening pushes down into the dermis as a solid hair germ, around which the dermis forms a hair follicle. The hair germ soon differentiates into two distinct parts, a peripheral and a central. The former gives rise to the external root sheath and becomes the inner, epidermal coat of the hair follicle, from the outer dermal portion of which it is separated by the so-called hyaline layer. The central part of the hair germ gives rise to the hair shaft itself and to the inner root sheath, which closely invests the base of the shaft. The latter consists of a central medulla or pith, a cortex, and an outer cuticle; the pith is made up of a loose, dry tissue with large intercellular spaces filled with air; the cortex is a dense layer containing the pigment; the cuticle is the covering of the hair, and may be smooth or more or less rough, and ornamented with scales and other projections. At the base of the shaft and inclosed by the swollen or bulbous base is the hair papilla, which is well supplied with blood vessels and thus furnishes the nourishment necessary for the growth of the hair. When a hair is shed, a new hair may arise in the same follicle from a new hair papilla. Each hair follicle is provided with nerves, smooth muscles, and sebaceous glands, the latter keeping the hair oiled. By means of the muscles (arrectores pili) the hairs can be moved independently, but the movement of large numbers of hairs in unison is accomplished by the movements of the striped muscles of the skin. Sensations of cold or of fear cause an involuntary contraction of these muscles in man, causing the feeling of an erection of the hair on the head in terror, or "gooseflesh" in cold. In the lower animals this effect is produced by ill health. Horsemen have a very graphic expression for it, saying of the coat of an animal out of condition, that it "stares."

An infant's hair (called lanugo, from *lana*, wool) is shed soon after birth and replaced by a new covering. The short downy hairs on the human body are rudimentary remains of complete hairy covering in ancestors of the race. Loss and repair appear to go on continuously up to a certain time, when baldness occurs with the majority. Each hair is said to live from two to four years. The grayness of hair in advanced life results from a deficient secretion of pigment and perhaps an increase of air in the medulla of the hair. Well-authenticated cases are on record in which the hair has grown gray or white in a single night, from the influence of fear, distress, or any variety of strong mental excitement.

With respect to the quantity of hair that grows on the human body, there are great differences in different races. The Mongols, and other northern Asiatics who are similar to them, are noted for the deficiency of their hair and for scanty beards, and the same character is ascribed to all the American Indians; while, on the other hand, among the Ainos of Japan or in the Kurilian race there are individuals who have hair growing down the back and covering nearly the whole body. The northern Asiatics and the American Indians have generally straight, lank hair, while Europeans have it sometimes straight and flowing and occasionally curled and crisp. Negroes present every possible gradation from a completely crisp or what is termed woolly hair to merely curled and even flowing hair; and a similar observation holds regarding the natives of the islands in the great Southern Ocean.

The length to which the hair of the head may grow normally, especially in women, is very considerable. A North American Indian of the Crow tribe is said to have had hair that was 10 feet, 7 inches in length. About 1878 there was exhibited in New York City a family of Russians who were almost covered with long hair. Their foreheads, noses, and cheeks were so shaggy that their eyes could scarcely be seen, and their ears were concealed by the hair that grew from them. Cases occasionally occur where there is an abnormal abundance of hair of considerable length in women, on parts where the hair is usually little more than down. A well-known case is that of Julia Pastrana, whose ears and all parts of the face except the eyes were covered with hair of different lengths. The beard was tolerably thick, the hairs composing it being straight, black, and bristly, the part of it which grew on the sides of the chin hanging down like two plaits. The upper portion of the back of the neck and the hinder surface of the ears were covered with hairs. On the shoulders and legs the hairs were as abundant as they are occasionally seen on very powerful men. See BEARD; WIG.

On the other hand, there may be a deficiency or even entire absence of hair. The effect may be more or less general or localized and may be either congenital or acquired. It is stated that about 90 per cent of cases of baldness (q.v.) are due to seborrhœa, which causes an excess of dandruff. This widespread affection is due to bacterial infection. The symptoms consist in the presence of small grayish-white greasy scales, falling of the hair, and more or less itching, with usually a red scalp. The primary site of the disease is, in most cases, the scalp; not infrequently, however, it extends to the face, chest, and back (seborrhœal eczema). Unless treatment is instituted, the disease results in permanent baldness, by interfering with the nutrition of the hair and by destroying the roots and papillæ of the hair. Seborrhœa is communicable, and therefore the use in common of combs and hairbrushes should be discouraged. The treatment consists in avoiding much water as well as avoiding frequent shampooing, and the local application of sulphur, carbolic acid, chloral, resorcin, some salt of mercury, or some other parasiticide, either in the form of an ointment or a lotion.

The services of hair in animal economy are various, though there is reason to believe that the primary use was the maintenance of a uniform body temperature by preventing loss of heat by radiation. Hair is an excellent nonconductor of heat, especially in the form of wool. Its warmth-conserving quality is largely due to the air entangled among it. The widespread use among men of the skins of mammals in the form of fur is ample evidence of their value as nonconductors. In the form of bristles and spines, which are simply excessively stiff hairs, hair often serves a protective purpose, as in the hedgehog and porcupine. In other cases the hair becomes fused with dermal plates and helps to form a defensive armor, as in the armadillo and pangolin. And finally in entering into the composition of some horns, as in the rhinoceros, hair reaches the extreme of its defensive uses. In many animals, notably the cats, hairs may become organs of touch of great sensitiveness, especially in the region of the mouth. Such hairs, known as vibrissæ, are supplied with special nerves to fit them properly for their purpose. Whether claws and hoofs are to be regarded as modified hair is still an unsettled question. For chemical composition, see table under HORN. Consult: Walsh, *The Hair and its Diseases* (London, 1902); Wiedersheim, *Comparative Anatomy of Vertebrates* (New York, 1897); W. A. Kidd, *The Direction of Hair in Animals and Man* (ib., 1904); Mueller, *Hair* (ib., 1913).

HAIR, Diseases of the. See Hair; Baldness.

HAIR, in Plants. See Trichome.

HAIR'BIRD'. A local name in the Eastern United States for the chipping sparrow (*Spizella passerina*), in reference to the fact that its nest is now made almost entirely of horsehairs. See Sparrow.

HAIR'CLOTH'. A fabric of horsehair, woven on a warp of cotton, linen, or worsted, and formerly much used in upholstering furniture. The long hair from horses' tails is chosen for the purpose. The hair is drawn, straightened, and assorted, then woven on power looms. This material is now little used for upholstery, but is extensively employed by tailors and dressmakers as a stiffening fabric for interlinings, its superiority to other materials used for the purpose being that it is unaffected by moisture. Haircloth is also employed for sieves for expressing oils, etc.

HAIR'DRES'SING. An important part of costume (q.v.). The most ancient picture monuments show coverings for the head which must certainly be wigs (see Wig) and others where it is doubtful whether the natural hair, long and elaborately curled and crimped, or an artificial imitation of it, is intended. Hairdressing is sometimes entirely decorative in intention, and sometimes traditional or symbolic in character, intended to convey the idea of personal dignity, of having attained a certain age, of a certain rank in the community, of bravery, like the curious ring worn by Zulu warriors, in which the short curling hair in a circle as large as the top of the head allows and stiffened with gum, forms a very obvious coronet. A religious form of hairdressing is the tonsure or partial shaving of the head common in many lands, which in the form used by the Roman Catholic monks is familiar to us (see Tonsure) and may be regarded as an attached and a permanent kind of crown.

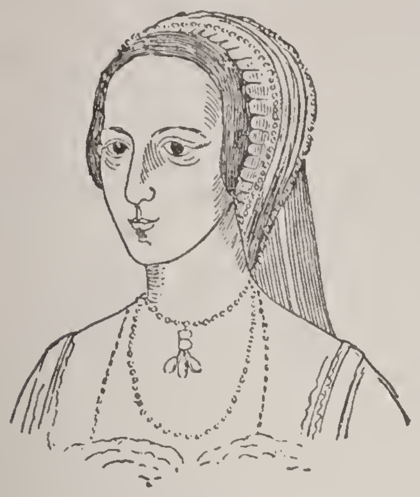
EGYPTIAN HAIRDRESSING.

Hairdressing in Ancient Times. The Egyptian hairdressing, as shown in the mural sculptures and paintings, was extremely elaborate and varied. The hair was divided into many tresses, each thickly plaited, or into two very broad and flat braids, one on each side of the head, while the hair behind was cut short; or into long parallel braids of great number, which were again grouped in masses, one mass falling in front of the shoulder on either side and the larger mass behind. Wigs were evidently very common. Among the Greeks the statues and bas-reliefs which we have of the sixth century B.C. and before show a very elaborate style of dressing the hair common to both men and women. The heads even of athletes show the hair crimped and curled, retained by a broad band, in front of and below which the little curls are arranged in corkscrews, or in curls made spiral at the end and fixed close to the forehead, evidently retained by some very tenacious cosmetic. One most beautiful headdress of which the date can be nearly fixed is that of the Apollo in the eastern pediment of the temple of Zeus at Olympia. The hair, radiating in all directions from the crown of the head, is generally rippled; it is retained by a band above the ears and falls below this band in short, curling locks parted so as to leave the ear free. At the same epoch, however, viz., about 450 B.C., the portrait statues, or those which may seem to be so, have the hair in a less elaborate style, worn naturally as in many heads of both old and young men of the great period of Greek art, and the heads of women of the same periods have the hair not very long and gathered at the nape of the neck or retained by a broad fillet, a stephane, or the like, and falling on the neck, but not below the shoulders. In the fourth century B.C. and later the headdress of men becomes less and less a matter of moment. The hair is worn in its natural curls or cut very short, and it is evidently the purpose of the sculptor to insist upon the form of the head, which the hair is not allowed to conceal. At the same time the headdress of women becomes more and more elaborate. Among the Roman hairdressers this Greek tendency continues. The typical head of a man of family has short-cut hair, while the headdress of women, though charmingly simple and natural, and setting off the head well during the years of the later Republic and the early Empire, is shown as extremely fantastic in the busts and medals of women of the Imperial court.

FIFTEENTH CENTURY.
(The Netherlands.)

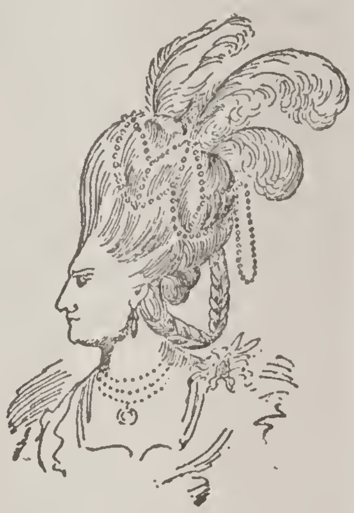
Hairdressing in Later Times. Towards the end of the Middle Ages in the latter part of the fourteenth century, men and women alike, of the wealthier classes, began to have elaborate coiffures, sometimes wrought into a glossy ring 2 or 3 inches in diameter reaching diagonally from above the forehead, touching the ears and to the nape of the neck, or in two great puffs concealing the ears, or, in the case of women, beneath a broad cushion or elaborate hat (see Hat), which seems to be supported by a volume of crimped and curled hair below. The well-known portraits of Henry IV (died 1610) and his Minister, the Duc de Sully, show this fashion carried into later times. The beard is combed out and curled with great nicety, gummed in a radiating form like a fan below and on both sides of the lower lip, and the mustache in like manner is curled and rolled upward from the mouth, the whole evidently held in place by some glutinous medium. The hair, when abundant, is also rolled back from the forehead and temples in a way which is very effective and reminds one of the "Pompadour" style of hair dressing which has been in fashion for women during several epochs since. During the boyhood of Louis XIV, and in England during the reign of Charles I, the long hair, perfumed and carefully adjusted, was not allowed to blow freely in the wind, but was tied with ribbons into long and heavy locks. The fact that Louis

XIV in his youth had unusually long and abundant hair seems to have been the main cause of the introduction of long curled wigs, by means of which his courtiers thought to ape the natural gifts of their master, and which the master himself adopted when the loss of his own hair made it seem expedient.



SIXTEENTH CENTURY.
(England.)

The use of wigs was well established by 1680. The coiffure of women during the last two-thirds of the seventeenth century was extremely tasteful and well adapted to the head and face, varying, as it did very largely, according to the age, complexion, and stature of the wearer. The curling hair lying on the neck and bare shoulders, and covered by a crêpe veil which we associate with the simpler dress of court ladies and the costume of the richer bourgeoisie, was followed by, or alternated with, lighter and shorter curls which seem to blow in the wind. Towards the close of the century the tall headdresses of lace and starched cambric begin to come in, but these are mere modifications of the veil, and the hair is not very elaborately dressed, being gracefully combined with the loose cap which covers the back of the head and arranged in ringlets around the forehead and cheeks, while the stiff, upright, fan-like plaits of the "tower" tend rather to elongate the head and increase the apparent stature than to form in themselves a mere headdress. In the first part of the reign of Louis XV, with all the fantastic elaboration of costume, the enormous panier or expanded skirt, the loose sleeves and collar and the rest, the head is generally dressed very simply, and it is obviously the purpose of the whole toilet to make the head seem very small in proportion. But as the gown decreased the coiffure expanded, and by 1750 was a huge edifice of curls stiffened with wire, haircloth, etc., and arranged to carry a little cap or hat entirely removed from the scalp and adorned with feathers and flowers. Seldom has hairdressing been so rich and fantastical. During the reign of Louis XVI the headdress of women grew still more fantastic, and we read of one in which a model of a ship of war was carried in the place of the hat upon this structure of curls and crinoline. These extravagances were gradually abated. In the first part of the nineteenth century women dressed their hair very simply, letting it fall at the sides in a series of ringlets, and gathering it around the back of the head with a ribbon. Somewhat later the side curls were done away with, and the hair was arranged on the top of the head with elaborate and fantastic headdresses and much use of false hair. *Chignon* was the word used to describe the hair when dressed in a large roll, and especially when arranged over a cushion, or other support.



1750 (England).

Consult: Villermont, *Histoire de la coiffure féminine* (Paris, 1892), a most comprehensive treatment of the subject; Child, *Wimples and Crisping Pins* (New York, 1895), a popular historical sketch of hairdressing; Manoni, *Acconciature nell' antichità* (Milan, 1895); Wollensack, *Der Damenfriseur* (Stuttgart, 1897); G. W. Rhead, *Chats on Costume* (New York, 1906). See also BEARD.

HAIR DYE. A substance employed for changing the natural color of the hair to a preferred one and for hiding the approaches of age as indicated by the presence of gray hairs. Usual methods consist in washing the hair with a solution of some metallic salt known to have the effect of darkening its color. These are the salts or oxides of silver, mercury, lead, and bismuth. Peroxide of hydrogen is used to produce a golden tint. The most perfect mode of dyeing the hair, however, is that of previously preparing it by a complete soaking with a solution of sulphide of potassium. The strength of this solution must depend on the depth of tint intended to be given; the stronger the solution the darker the color will be. When thoroughly wetted, the hair is allowed to dry partially; and while still damp it is to be again thoroughly wetted with a solution of nitrate of silver, also proportioned in strength by the same rule as in the case of the solution first applied. This makes a very permanent dye, which only requires renewing as the new growth of hair becomes conspicuous. The fashion of dyeing the hair is very ancient and belongs as much to savage as to civilized nations, but in the case of the former vegetable dyes have been chiefly used; the ladies of China and other Eastern countries also resort to dyeing, the juice of the petals of *Hibiscus trionum* and probably other species of hibiscus being in general use with them. Many hair dyes cause disease; some kill the hair, and it assumes the appearance of mouse fur.

The detection of stained hair is sometimes an object of medicolegal investigation. Lead may be detected by boiling the hair in dilute nitric acid and then applying the tests for lead (q.v.) to the acid solution; while the presence of silver may be shown by digesting the hair in dilute hydrochloric acid or chlorine water, when the resulting chloride of silver may be dissolved out with a solution of ammonia and submitted to the ordinary tests for silver (q.v.).

HAIR EEL. See HAIRWORM.

HAIR GRASS (so called from the slender form). A name applied to several species of grasses, the members of which have loosely panicled flowers. The species are natives of temperate and cold climates. The tufted hair grass, or turfy hair grass (*Deschampsia cæspitosa*), common in most pastures and meadows of middle and northern Europe, is a beautiful grass when in flower, but forms coarse tufts 2 to 4 feet high. It has very rough leaves, which, if drawn quickly across the hand, inflict considerable wounds, whence the plant sometimes receives the name of "cutting grass." If other herbage is within reach, cattle reject it. It is sometimes used for thatching ricks of hay or grain and in some places for making mats. Soils upon which it grows luxuriantly usually need draining. It is sometimes tolerated, in order to add to the bulk of marsh or bog hay, but is carefully eradicated wherever agricultural improvements take place. For its extirpation drainage is requisite above all things; but the digging out of the tufts is also practiced, and other grasses are sown instead. This grass is, however, sometimes sown to form cover for game, particularly hares; and in marshy situations, for snipes and wild fowl. It is the "windlestrae" of the Scotch. *Muhlenbergia capillaris, Agrostis scabra*, and various species of *Aira* are also known as hair grass.

HAIRLESS DOG. Races of dogs whose skins are almost completely devoid of hair have been known since ancient times and in widely separated parts of the world. The Chinese have a variety which they cook and eat as a delicacy. This Oriental hairless dog is of a small greyhound-terrier type, mostly entirely destitute of hair. One variety has a few straggling hairs on the body and a tuft at the tip of the tail. In east India the mountaineers of Coimbaton use a dog they call the "polygar" in the chase of the bear and wild boar, which is wholly destitute of hair. It is fierce and unmanageable except by its keeper and in this respect differs from all other known hairless dogs. In Central Africa there is a naked dog of greyhound type, about 14 inches tall and with a slender body about 22 inches long, and much retracted in the flanks. A few hairs are found near its tail, around the mouth, and on the legs. Its skin is black. Rengger gives reasons for believing that when America was discovered by Europeans a hairless dog was domesticated, which was distinct from the hairless dog found preserved in the ancient Peruvian burial places, described by Tschudi under the name of "Inca dog." Other hairless dogs exist in the Philippine Islands, the Antilles, and the Bahamas. A large naked dog is figured by Clavigero as one of the indigenous animals of ancient Mexico. In the native language it was called by a name translated into "servant dog." The small edible dogs of the Mexicans, which the Spaniards spoke of as "very tender and delicate food," undoubtedly were the puppies of this breed. Their Indian equivalent title was "sucker," because, doubtless, they were taken from their mother to be eaten before they had ceased to nurse.

Hairless dogs, called "Mexican hairless," are often shown in the pet-dog classes at the dog shows. They are very like shaved black and tan terriers, but lack the keen eye of that dog. They are mostly of a blue or brownish color, entirely devoid of hair except a few straggling single ones here and there on the body and tail, and sometimes a small tuft on the head. The skin, as a rule, is wrinkled, and generally harsh to the touch.

HAIR MANUFACTURES. The difference between hair and wool is that the surface of the former is smooth and hard, while the latter is covered with overlapping scales so that it can be felted easily. The hair of animals is woven into fabrics, made into brushes, and used as a stuffing for upholstery. *Horsehair* is woven into haircloth (q.v.). It is also twisted into thick yarn and woven into sacking in Anatolia and Rumelia. *Cow hair* is used by the masons as a binder for plaster. It is also worked up into a rough yarn and woven into carpets to substitute a portion of sheep's wool, and in Norway is made into socks by the peasants. *Pig's hair* is similarly employed in China; and among the natives of the Hudson Bay Territories dog's hair is used for the same purpose. The *goat's hair* of Tibet and Persia, and the *camel's hair* used in weaving, belong rather to the true wools, and will be treated of under WOOL. The shorter kinds of horsehair from the manes and tails, also cow hair and the softer kinds of pig hair, are twisted into ropes, which, after being boiled and then thoroughly dried in an oven, are pulled to pieces. The hair retains the twist given it and is then used for stuffing seats of chairs, etc.

Brushes of Hair are of various kinds; some are made of the stiff hairs from the backs of pigs, and others are made of the soft hair of the camel and other animals. The hairs for the first kind are usually called bristles. They are chiefly used in the manufacture of hair and clothes brushes, tooth and nail brushes, house-sweeping brooms, the larger kinds of painters' brushes, etc. The second kind are chiefly employed in the manufacture of the fine brushes or hair pencils used by painters and artists. The best bristles come from Russia. Besides the camel, hairs are yielded for this purpose by the badger, sable, goat, dog, etc. See BRUSH AND BROOM.

Human Hair is sometimes employed for ornamental purposes, as chains and artificial flowers, but its principal use is to supply natural deficiencies, and for this purpose it is made up into wigs, toupees, and switches. See WIG.

The greater part of the hair used in Great Britain and the United States is imported through French dealers, who collect it from the peasant girls of Holland and Germany as well as of their own country. The light colors are usually obtained from the former countries, and the dark shades from Brittany. This does not arise from the circumstance that these countries yield the finest heads of hair, but because the poverty of the people causes its sale to be a matter of importance. The girls sell all but the front hair and then wear a handkerchief or *coiffe* to hide their shorn locks. At the annual French fairs regular meetings are arranged, where the purchases are made. According to the thirteenth census, whose statistics were published in 1913, there were in the United States, in 1909, 250 establishments engaged in the cleaning, bleaching, curling, and other preparation of human hair, yak hair, mohair, and other hairs, and in manufacturing them into articles of adornment. The product, which in 1909 was valued at $11,216,175, included ornamental hair work, puffs, rats, refined yak hair, rolls, theatrical and other wigs, toupees, transformations, turbans and turban pads, waves and wavy hair for switches and wigs. In 1913 there were imported into the United States 1,529,342 pounds of human hair, valued at $2,530,504, and human hair cleaned and manufactured valued at $198,134.

HAIR POWDER. A powder usually made from pulverized starch, scented with violet or some other perfume, and at one time largely used for powdering hair or wig. (See WIG.) The fashion came into vogue at the French court during the reign of Charles IX (end of the sixteenth century), and during the two succeeding centuries it was largely used in England, France, and other European countries by both men and women of the higher and middle classes. During the age of Louis XIV hair and wigs were filled with it. To make the powder hold, the hair was usually greased with pomade. In England in 1795 a tax of $5 was put on the use of hair powder, and at one time yielded $100,000 per annum. The French Revolution, which tended to simplify fashion, hastened the return to natural and unpowdered hair. At the present day powder continues to be used by some of the footmen of nobility and royalty as part of their livery; and occasionally, at public or private *bals costumés*, ladies and gentlemen appear with their heads powdered. At the time of the abolition in 1869 of the English tax on hair powder, it was paid by about 800 persons. See HAIRDRESSING.

HAIR SEAL. Any seal not a fur seal. More especially, however, the term designates the typical, or true, seals of the family Phocidæ. See SEAL.

HAIR SPRING. See BALANCE AND BALANCE SPRING; WATCH.

HAIR′STREAK′. A butterfly of the family Lycænidæ and commonly one of the genus *Thecla*. The hairstreaks may be distinguished from the "coppers" and "blues" of the same family by the fact that the radius of the fore wing is only three-branched. They are brown, with very fine stripes on the lower surface of the wing; hence the common name. A few species are blue or green. Some of the stigmata are filled with scent scales, known as "andriconia." There are more than 50 species of hairstreaks in North America. The largest species (*Thecla halesus*), found in the southeastern part of the United States, expands 2 inches. The male is bright blue and black; the female has more black than the male. The commonest species in New England is *Thecla calanus*, a small, dark-brown form. The larvæ of the more common of the hairstreaks feed on the oak; others feed upon wild plum, the hop plant, *Astragalus*, *Hosackia*, and other plants, and some are especially fond of the unopened flowers. See Colored Plate of BUTTERFLIES, AMERICAN.

HAIR′TAIL′ (so called from the attenuated tail). A fish of the spiny-rayed family Trichiuridæ, characterized by the compressed and elongated body, the posterior end of which gradually tapers into a fine filament. The dorsal fin is long and low, and composed of spines and rays almost hidden in the skin. There are no caudal or ventral fins, and the skin bears no scales. They are voracious fishes of the high seas, principally confined to the tropics and growing to a considerable length. Compare CUTLASS FISH; THREADFISH.

HAIR′WORM′. Any of the long, thread-like nematode worms of the parasitic order Gordioidea. (See GORDIUS.) In these nematodes the body cavity is lined by a distinct epithelium; there is a simple large ventral nerve trunk, and the reproductive organs are arranged metamerically and are separate from the gonoducts. The group includes a small number of species, which are parasitic in locusts and other insects in the asexual, but free and mobile in the sexual, stage. They inhabit moist situations, are sometimes found on the leaves of plants, but more frequently in stagnant pools and in mud, through which they work their way with great ease. They often twist themselves into complex knots, whence their name "Gordius," from the celebrated Gordian knot, and many of them are sometimes found thus twisted together; but they are also often to be found extended in the water. The eggs are laid in long chains in the water, and the young which hatch from them swim about until they reach some aquatic larvæ into which they bore and encyst. When this insect is eaten by some minnow or other small fish, the cyst is dissolved, and the young Gordius lives parasitically in the intestine of its new host until it reaches sexual maturity, when it bores its way out of the cyst, passes into the intestinal cavity of the fish, and from thence is carried out with the fæces into the water. When fully grown, a large hairworm may be nearly 3 feet long. One popular name is "hair eel"; and a notion still prevails even among educated people that it is nothing else than a horsehair, which has somehow acquired life by long immersion in water, and which is destined in time to become an eel, or, as some say, a snake. They are often seen in fresh-water pools or horse troughs, whence they are supposed by the ignorant to be transformed horsehairs. A popular notion prevails in Sweden that the bite of the Gordius causes whitlow. Most hairworms in their last stage live in ground beetles and locusts, turning in the intestines of their host, and finally passing out of the anus. Consult Villot, "Monographie des Dragonneaux," in *Archives de zoölogie experimentale*, vol. iii (Paris, 1874).

HAITI, hā′tė, *Fr. pron.* ä′ē′tē′, also called SANTO DOMINGO, or HISPANIOLA. One of the four islands of the Greater Antilles, the second in area and population, and the only island of the West Indies besides Cuba that is politically independent. The name of the island requires special comment because the usage is not uniform. Haiti is the name given to it by the Caribs, who inhabited it, the word signifying "mountainous" or "high land." When Columbus discovered Haiti, he renamed it Hispañola (Hispaniola); colonized by the Spaniards, the name of Santo Domingo was given to its most important port, and in the course of time the English, French, and even the Spaniards came to know the whole island by the name of its capital and chief settlement. Early in the nineteenth century, at the suggestion of some leading geographers, the original name (Haiti) came again into use and is now commonly employed to designate (1) the whole island, 20,506 square miles, and (2) the independent republic which occupies the western four-elevenths of the island's area, 9242 square miles. The name Santo Domingo (q.v.) is now properly applied only to the republic occupying the eastern seven-elevenths of the island (officially, *República Dominicana*), or the Dominican Republic.

Separated from Cuba by the Windward Passage and from Porto Rico by the Mona Passage, both frequented by vessels to and from the Caribbean Sea, the island extends from lat. 17° 37′ to 20° N. and from long. 68° 20′ to 74° 28′ W. (Map: West Indies, L 5). It is about 400 miles long and varies in width from 24 to 165 miles. The island is covered with forested mountain chains and isolated mountain masses, interspersed with fertile valleys. The highest point of the island and of the West Indies, Loma Tina, rises to over 10,000 feet, and the average altitude of the Sierra del Cibao is about 7000 feet. The coasts are mostly elevated and greatly indented, forming numerous natural harbors. The rivers, although numerous, are naturally short and swift, most of them having their sources in the mountains. A few of them are navigable for small boats; their mouths are generally obstructed. There are several large lakes in the western part of the island, one of them, Enriquillo, being evidently connected with the Caribbean Sea, judging from the specific gravity of its water and its tides. The principal formations are sandstones and schists, the crystalline zone being found chiefly in the centre of the island. Tertiary deposits are found in some of the mountain chains. The minerals are supposed to be abundant, and some gold is found in the streams. The climate is hot and muggy in the low-lying parts of the island (as at Port-au-Prince), the temperature during June, July, and August frequently rising to about 95° F., but rarely above this. The mean annual temperature in the Port of Santo Domingo is a little cooler than in Port-au-Prince. In the mountains the climate is much cooler, the average for the summer months being about 77° F. There are two rainy and two dry seasons, differing in their duration in different parts of the island. The rainfall is heaviest in May and June. Although there are no active volcanoes, earthquakes occur not infrequently and are occasionally very disastrous. Haiti has a remarkably rich flora. Most tropical products are found on the island, and many species are indigenous, such as rice, cotton, cacao, ginger, arrowroot, tobacco, and different kinds of fruit. Valuable timber—mahogany, cedar, and logwood—is found in abundance on the mountain slopes. The fauna is relatively poor, and most of the domestic animals are of foreign origin.

The Republic of Haiti, the first of the negro republics, comprises the western part of the island and with the adjacent islands of Tortuga, Gonave, and Vache covers an area of 10,200 square miles (or, as estimated by others, 11,090 square miles). The country is almost exclusively agricultural and has a soil exceedingly well adapted for cultivation. The principal product during the French occupation was cane sugar, of which over 176,000,000 pounds were exported in 1791. Coffee was also cultivated in those days, but only on a limited scale. At present coffee ranks first in the exports of the country. In 1891 the exports amounted to 78,000,000 pounds; in 1899, 61,600,000 pounds. The exports during the year ending Sept. 30, 1913, were: clean coffee, 54,730,591 pounds (as against 75,714,466 pounds in 1911–12); pickings (triage), 2,326,285 pounds; coffee in parchment, 536,954 pounds. The cultivation of coffee is carried on by primitive methods, and large plantations, equipped with improved machinery, are a thing unknown in the Republic. Sugar is grown only in quantities sufficient to meet the domestic demand. While the agricultural possibilities of Haiti are large, the backward condition of agriculture clearly shows that they are not fully utilized. This is due to lack of capital, high export duties, the roadless condition of the country, frequent revolutions, and the unprogressive character of the people. Many kinds of fruit that are cultivated in Jamaica and find a ready market in the United States could easily be grown in Haiti, which has the same advantages in point of distance as Jamaica. Cotton, grown extensively in colonial times, now receives only scanty attention, and little is available for export. The same is also true of indigo. The cocoa yield was 3453 metric tons in 1912, but only about 1900 tons in 1913. Logwood is exported in considerable quantities, although the exploitation of the forests is hindered by the lack of transportation facilities. The commerce of Haiti for the year ending Sept. 30, 1913, had a total value of $28,449,075, of which sum $9,876,555 represented imports (chiefly from the United States), and $17,285,485 exports. The principal articles of export were coffee, logwood, lignum vitæ wood, cocoa, hides and skins, cotton, and cottonseed. Small quantities of copper, lead, and zinc were also exported. The United States takes only a small portion of the exports, which go mostly to France, Germany, and Great Britain. Two-thirds of the coffee, the principal article of export, goes to France. Very little of the coffee comes to the United States, as Brazil coffee is cheaper and gives a larger profit to importers. The United States supplies about 65 per cent of the imports, consisting chiefly of provisions, flour, and textiles. Haiti has 15 ports, most of which are open to foreign commerce. The most important of them are Port-au-Prince, the capital, Aux Cayes, Jacmel, and Gonaïves. The roads of Haiti are so poor that travelers from one port to another almost invariably go by sea. At the end of 1912 the Republic had 140 miles of railways.

Haiti has a republican form of government, and its present constitution, adopted in 1889, is an outgrowth of the original instrument of 1805, which has passed through numerous changes and modifications in consequence of the political upheavals to which the Republic has been subjected. The President is elected for seven years by the Senate and Chamber of Communes in joint session. He is assisted by a cabinet of six members, nominated by himself. The Chamber of Communes consists of 99 members elected directly by the people for three years, each commune being represented in proportion to its population. The Senate has 39 members, chosen by the Chamber of Communes for six years, from two lists, one submitted by the President and one by the Electors. The Twenty-eighth Congress began its regular session on April 23, 1914. The administrative divisions of the Republic are modeled after those of France. The country is divided into five departments, subdivided into arrondissements and communes, and the latter into sections or districts. The laws of the Republic are based on the Code Napoléon and the forms of legal procedure are the same as in France. Foreigners, and especially white foreigners, are prohibited from owning real estate and are otherwise discriminated against. The constitution provides for a system of free elementary schools, but this provision is hardly observed, the number of schools in the rural districts being far from adequate. There are altogether about 400 free elementary schools and 5 public lycées. There is a University of Haiti, and a normal school for girls was recently opened. The revenue of the country is derived almost exclusively from import and export duties, a part of the latter being a guaranty for several debts. The expenditures for 1913–14 were estimated at $8,127,000, and the revenues at $6,282,000. The public debt in 1912 amounted to $12,763,000 and 119,286,000 francs, besides an unfunded debt of $7,077,000. By a law sanctioned on March 1, 1914, the nation acknowledges the debt of the revolution, and the Secretary of the Treasury is authorized to make an inventory of same. A reform of the country's finances is now being carried out, the new unit of value to be a silver gourde of the fineness and value of an American quarter dollar. The military strength of the Republic is 12,060 men, chiefly infantry. The navy consists of six small vessels.

No accurate figures for the population of the Republic are available, as no census has ever been taken in the country. An ecclesiastical enumeration of 1905 placed it at about 1,425,000, which is less than some earlier estimates. It was estimated at 2,500,000 at the end of 1912. According to general estimates, about 90 per cent of the total population is black, and the remaining 10 per cent consists chiefly of mulattoes, including a few Europeans. The mulattoes form the aristocracy of the Republic and occupy a prominent position in state affairs as well as in the professions. The negroes are, as a rule, inferior in intelligence to the mulattoes, and the relations between them are those of mutual contempt and hatred—a fact which has played a prominent part in the political affairs of the Republic and hindered considerably its development. The state religion is Roman Catholic, although religious freedom is guaranteed by the constitution, and the Protestant churches also receive considerable support from the state. In its social and intellectual life Haiti is full of incongruities. The higher classes, who mostly receive their education in France and in many cases travel extensively, do not in any essential respect differ from Europeans of the same class. The peasantry, on the contrary, seem to show a retrograding tendency in spite of a century of practical self-government and freedom. A large number of the lower classes, especially in the rural districts, practice *voodoo* worshiping, and, according to some authorities, the practice is occasionally accompanied by human sacrifices and acts of cannibalism. Marriage ties are very loose, and polygamy prevails to some extent. The current language is French, but the peasantry speak a dialect. The capital is Port-au-Prince (q.v.). There are United States consuls at Port-au-Prince and Cape Haïtien, and consular agents at Gonaïves, Aux Cayes, Jacmel, Jérémie, and Petit Goâve.

History. The island of Haiti was discovered by Columbus in 1492. In 1496 Bartholomew Columbus founded Santo Domingo, the first European town in the New World. The natives, who were very numerous, were quickly exterminated in the contact with the conquering race, and negroes were imported from Africa to take their place as laborers. The blacks soon came to form the vast majority of the population. After the colonization of the mainland Haiti was neglected, and in the seventeenth century a colony of French buccaneers were allowed to make their headquarters at the western end of the island. A result of this occupation was that part of the island was ceded to France by the Treaty of Ryswick (1697). A prosperous and wealthy French colony grew up, but the large negro population, and especially the turbulent and discontented class of free mulattoes, were a constant source of disquietude to the planters, who would not allow civil rights to any portion of the colored population. During the French Revolution, at a time when there were dissensions among the white population, the negroes and mulattoes, encouraged by the reception accorded to their appeals by the people of France, rose against their oppressors. The insurrection, which broke out in 1791, was marked by the most bloody excesses. In 1793 the commissioners of the French Convention proclaimed the freedom of the blacks. At this time invasions by the British took place. The blacks were rallied, organized, and led to victory by Toussaint L'Ouverture (q.v.), who was recognized by them as generalissimo of their forces in the island, and who expelled the British in 1798. Three years previously Spain had ceded the eastern part of the island to France, and this was now included by Toussaint, who now reigned as dictator in practical independence, within his sphere of authority. In 1801 Napoleon Bonaparte sent a force under General Leclerc to subdue the island. Toussaint was captured and deported to France, where he died in prison (1803). His place was filled by other leaders, and the French were finally expelled in December, 1803. The victorious general, Dessalines (q.v.), declared Haiti independent and assumed the title of Emperor (1804). He was assassinated in 1806. Then for some years the northern part of Haiti was held by Christophe (q.v.), a negro, who in 1811 assumed the royal title, while Pétion (q.v.) established a mulatto republic to the south. Upon the death of Christophe in 1820, the power was seized by Boyer, the successor of Pétion, who then proceeded to the conquest of the eastern part of the island, which had been reoccupied by Spain, but had revolted, and formed a republic. The whole island was ruled with wisdom and firmness by Boyer (q.v.) as President until his overthrow in 1843. France recognized the independence of Haiti in 1825. In 1844 the eastern part declared its independence, forming the Republic of Santo Domingo. In the west—the Republic of Haiti—a series of struggles between the blacks and mulattoes for political ascendancy lasted for many years. In 1849 the negro President Soulouque proclaimed himself Emperor as Faustin I, and for 10 years ruled in a despotic manner, attempting more than once to annex the Republic of Santo Domingo to his dominions. The Republic was restored at the beginning of 1859 by the mulatto Geffrard, who held power till 1867. In 1888–89 civil war raged between the generals Légitime and Hippolite, who were rival candidates for the presidency. The latter was victorious and ruled with unlimited authority till his death, in 1896. He was succeeded by General Simon Sam, who was President until May, 1902, when he was forced to resign. Civil war ensued between Boisrond-Canal, head of the provisional government, and M. Firmin, Haitian Ambassador at Paris, who established a rival government at Gonaïves, in the northern part of the island. In October, 1902, Firmin was overthrown, and in December General Nord Alexis was proclaimed President by the army. The administration of Nord Alexis was very turbulent, a revolution breaking out in 1908, which he tried to suppress by summary methods. Then Gen. Antoine Simon started a revolt and occupied Port-au-Prince, Nord Alexis fled, and Simon assumed the presidency. Simon in turn faced revolution in 1911, was penned up in Port-au-Prince, and finally escaped to Jamaica. General Lecomte was elected President, but recognition was withheld by foreign powers pending payment of the arrears on the Haitian debt. General Lecomte lost his life in a fire (Aug. 8, 1912) and was succeeded by Gen. Tancrède Auguste, who died the following year. Michel Oreste was chosen for the unexpired term (May 2, 1913). He made arrangements for the arbitration of the French claims. In 1914 a successful revolt took place, under Davilmar Théodore and Oreste Zamor, each of whom proclaimed himself President. Zamor first triumphed, and later Théodore; but disturbed conditions continued. For national coat of arms, see Colored Plate in HERALDRY.

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HAJDU-BÖSZÖRMÉNY, hī′dụ bẽ′sẽr-mā-ny′. See Böszörmény.

HÁJEK OF LIBOČAN, hä′yĕk ŭv lē′bô-chån, Václav (?–1553). A Bohemian chronicler. He wrote in the Czech language a *Chronicle of Bohemia* (1541), which was translated into German by Johann Sandel (1596) and was long considered one of the best sources of Bohemian history. Modern criticism, however, has found it to be very inaccurate. Consult Palacký, *Würdigung der alten böhmischen Geschichtschreiber* (Prague, 1830–69).

HAJJ, hăj (from Ar. *ḥajja*, to make a pilgrimage). An Arabic word, applied specifically to the pilgrimage to the Kaaba (q.v.), or sanctuary of Mecca, which every Mohammedan whose means and health permit is bound to perform once at least in his life. The original sense of the word appears to be "circuit," and points to the ancient custom of passing around a sanctuary as one of the rites connected with a visit to a sacred spot. The word also exists in Hebrew (*hag*), and while referring originally to the pilgrimage to the sanctuary at Jerusalem in the fall of the year, is generalized as the designation of any of the three great festivals—Passover, Pentecost, Tabernacles—as provided for in the Pentateuchal codes. As concerns the Arabic institution, it appears that many generations before Mohammed a sanctuary in Mecca had acquired considerable popularity among the Arabs. This was due in part to the position of Mecca on the highway leading from Syria to Yemen, and in part to the fact that Mecca was visited annually by many thousands on their way to Okaz, where a great fair was held, which brought Arabs from all parts together. Far more sacred, however, than the sanctuary at Mecca was a mountain, Arafat, outside of the city, and the visit to this mountain, which was the real goal of the ancient Arabic Hajj, was combined naturally with a circuit around the Kaaba. The care of the latter at the time of Mohammed was in the hands of his family, the Koreish, and this circumstance may account for the devotion of the prophet to the old sanctuary—a devotion which, though inconsistent with his general religious doctrines, he was unable to throw off. With increasing years his fondness for the Kaaba, which he designated as the *Beit Allah* (house of Allah), increased, and his visit to it the year before his death led to the institution of the pilgrimage as one of the five cardinal duties of every Mohammedan. (See Mohammedanism.) The visit to the Kaaba may be made at any time, but the full rites of the Hajj, including the visit to Arafat, can only be carried out in the twelfth month of the Mohammedan Calendar, known as Dhu'l Hajjeh, or month of pilgrimage. The pilgrims have to set out for their journey one or two months before, according to the respective distances they have to traverse. They first assemble at several variously appointed places near Mecca in the beginning of the holy month, and the commencement of the rites is made by bathing and assuming the *ihrâm*, or sacred habit, which consists of two woolen wrappers—one around the middle, the other around the shoulders; the head remains bare, and the slippers must cover neither the heel nor the instep. It is enjoined that the pilgrims, while they wear this dress, shall be particularly careful to bring their words and thoughts into harmony with the sanctity of the territory they now tread—a territory in which even the life of animals is to be held sacred from attack. After assuming the sacred garb the pilgrim must not shave any part of his body, anoint his head, pare his nails, or bathe until the end of the pilgrimage. Arriving at Mecca, the pilgrims proceed at once to the temple and begin the holy rites there by walking first quickly, then slowly, seven times round the Kaaba, starting from the corner where the black stone is fixed. (See Kaaba.) This ceremony (called *tawaf*) is followed by the *sai*, or running, likewise performed first slowly, then quickly, between the two mounts Safa and Merwa, where before Mohammed's time the two idols Asaf and Nayelah had been worshiped. These ceremonies, accompanied by prayers, are repeated daily. The next rite takes place on the ninth of the month and consists in the *wukuf*, or standing in prayer and listening to a sermon on the mountain of Arafat. The whole of the succeeding night is spent in holy devotions at Mozdalifa, between Arafat and Mina. The next morning, by daybreak, the pilgrims proceed to the valley of Mina, where they throw seven stones at each of three pillars for the purpose of putting the devil to flight. The pilgrimage is completed with the slaughtering of the sacrifices—a sheep, goat, cow, or camel, according to the pilgrim's means—on the same day and in the same place. The sacrifice over, they shave their heads and cut their nails, burying the latter on the same spot. After remaining three more days at Mecca they take leave of the Kaaba, making the seven circuits and drinking water from the holy well Zemzem. Most Mohammedans combine with the Hajj a visit to Mohammed's grave at Medina—some three days' journey from Mecca. The return of the holy caravans is watched everywhere with the most intense anxiety and is celebrated—as is also the departure—with great pomp and rejoicings. Henceforth the pilgrim never omits to prefix the proud title of Hajji to his name. It is permitted to those who through bodily infirmity are incapacitated from performing the holy journey themselves to send a substitute, who acts as their representative in almost every respect, but this substitute has no share whatever in the merits and rewards belonging to the Hajj.

The number of pilgrims who assemble at Mecca varies greatly from year to year. It has often exceeded 100,000. Sir Wilfrid Blunt (*Future of Islam*, London, 1883) estimated the number in 1880 at about 93,000. The fanaticism of Mohammedans rigidly excludes all nonbelievers from the sacred soil of Mecca. Consequently the few Christians who have succeeded in visiting the place have done so in disguise and at the risk of their lives. As early, however, as the first decade of the sixteenth century an Italian, Ludovico di Varthema, witnessed the ceremonies and described them in his book of travels (Bologna, 1510; Eng. trans. by J. W. Jones, ed. with notes by G. P. Badger in the "Hakluyt Society Publications," vol. xxxii, London, 1863). In 1604 Johann Wild, an Austrian, was captured and forced to go to Mecca. He described his experiences in *Neue Reysbeschreibung eines gefangenen Christen* (Nuremberg, 1623). The first Englishman to enter the sacred city was Joseph Pitts, of Exeter, a sailor, who was captured by Algerine pirates in 1678 and held as a slave for 15 years, during which time he made the pilgrimage in company with one of his masters. His narrative was published at Exeter in 1704. During the nineteenth century the pilgrimage was performed by the following: the Spaniard Domingo Badia y Leblich, commonly known as Ali-Bei (1807; *Voyage d'Ali-Bei en Afrique et en Asie*, Paris, 1814); Seetzen (1809), whose journal was published after his death by Kruse and Fleischer (Berlin, 1854–59); Burckhardt (1814–15; *Travels in Arabia*, London, 1829); G. Finati (1814; *Travels*, ed. by G. A. Bankes, ib., 1830); Wallin, the Swedish explorer (1845; *Reseanteckninger från Orienten*, Helsingfors, 1863); Burton (1853; *Personal Narrative of a Pilgrimage to El-Medinah and Meccah*, 3 vols., ib., 1855, several later editions); Bicknell (1862); Von Maltzan (1864; *Meine Wallfahrt nach Mekka*, 2 vols., Leipzig, 1865); Keane (1880; *Six Months in Mecca* and *My Journey to Medina*, London, 1881); Snouck-Hurgronje (1884–85; *Mekka*, 2 vols. and a third of illustration, The Hague, 1888–89); Courtellemont (1894; *Mon voyage à la Mecque*, Paris, 1896); A. J. B. Wavell (1911; *A Modern Pilgrim in Mecca and a Siege in Sanaa*, London, 1912). Others are known to have visited Mecca, though accounts of their experiences have not been published. The most thorough and accurate descriptions of the pilgrimage ceremonies are those given by Burckhardt and Burton. Snouck-Hurgronje gives an account of life in Mecca, a history of the city drawn from original manuscript sources, and details regarding the various classes of the present population, and the arrangements made for receiving and taking care of the pilgrims, based upon a residence in Mecca of more than six months—a longer time than any other European has ever spent there. His illustrations are from photographs. Consult, besides the works already mentioned: Salih Soubhi, *Pèlerinage à la Mecque et à Médine* (Cairo, 1894); August Müller, *Der Islam im Morgen- und Abendland* (Berlin, 1885–87); Snouck-Hurgronje, *Het Mekkaansche Feest* (Leyden, 1880); Hogarth, *The Penetration of Arabia* (London, 1905). See MECCA.

HAJJI, hăj′ĭ, *Ar. pron.* hȧj′jē (Ar. *ḥajjī*, pilgrim, from *ḥajja*, to make a pilgrimage). An Arabic word, signifying one who has performed the Hajj (q.v.), or pilgrimage to Mecca. It is a title of honor prefixed to a person's name as an indication that this religious duty, obligatory upon every Mohammedan, has been performed.

HAJJI BABA OF ISPAHAN, hȧj′jē bä′bȧ ŭv ĭs′pȧ-hän′, THE ADVENTURES OF. A romance by J. J. Morier (1824). It is an Oriental *Gil Blas*, revealing a world of humorous insight into life in Persia. The Persian Minister to England is said to have remonstrated in behalf of his government against its satire and plain speaking.

HAJJI KHALFAH, hȧj′jē käl′fä, MUSTAFA IBN ABDALLAH KATIB TCHELEBI (c.1600–58). A celebrated Turkish historian and bibliographer. He was born at Constantinople about the end of the sixteenth century and died there in September, 1658. From 1622 till 1633 he was employed in the Turkish army and had an excellent opportunity of acquiring information regarding matters of history, geography, etc. He made the pilgrimage to Mecca, whence his name Hajji (q.v.). In 1635 he was at Constantinople studying and collecting material for his encyclopædia. In 1648 he was appointed second assessor in the army bureau of provisions. From this position he got his second name, Khalfah (assessor). His works are written in Turkish and Arabic. They include, besides smaller works: (1) the celebrated *Kashf al zunun fi asami'l kutub wa'l funun* (Names of Books and Sciences), written in Arabic, of which Flügel has given a Latin translation with the text, under the title *Lexicon Bibliographicum et Encyclopædicum a Mustapha-ben-Abdallah* (Leipzig, 1835–58). In this work is given a definition of each science; the titles, contents, language, dates of composition, and translation of more than 25,000 works are specified; also the names of the authors and dates of their death. It is the most complete catalogue in existence of works written in Arabic, Persian, and Turkish; (2) *Takwim al tawarikh*, written in Turkish, of which there is an Arabic translation and an Italian translation by Rinaldo Carti (Venice, 1697), a history of the world from the creation of Adam to 1655, containing notices of 150 dynasties, principally Asiatic; (3) *Fadhlaka*, a history of the Ottoman Empire from 1595 to 1655; (4) *Tuḥfat al kibar fi asfar al biḥar*, a history of the maritime wars of the Turks, which has been translated into English by Mitchell (London, 1831); (5) *Jihan numa*, Oriental geography, written in Turkish, translated into Latin by Norberg (Lund, 1818). Consult Brockelmann, *Geschichte der arabischen Literatur*, vol. ii (Berlin, 1902).

HAJJUG. See HAYYUJ.

HAKATA, hä′kȧ-tȧ. Formerly a separate city of Japan, now forming a part of Fukuoka (q.v.) (Map: Japan, B 7).

HAKE (abbreviation of provincial Eng. *haked*, from AS. *hacod*, OS. *hacud*, OHG. *hahhit*, Ger. *Hecht*, pipe, from AS. *haca*, bar, Norw. *hake*, hook; connected also with AS. *hōc*, Eng. *hook*, so called from the hooked shape of the lower jaw). A fish of the family Merluccidæ, closely allied to the cods. Several species are known—all large voracious marine fishes, inhabiting moderate depths, and of little value. The European hake (*Merluccius merluccius*) is common on all the coasts of Europe and, though its flesh is coarse and flaky, is extensively utilized by salting and drying, in which condition it is known as stockfish. It reaches a length of 3 or 4 feet. The American silver hake (*Merluccius* *bilinearis*), of the New England coast, and the Pacific hake (*Merluccius productus*) are also eaten, but are not well liked. The habits of hake are like those of the cod, and they are abundant on the "banks" off the northern shores of the United States, where they are caught in the same way and at the same time as the common cod. The average weight is about 5 pounds; the maximum weight falls under 20 pounds. This fish is generally eaten in the fresh condition and does not "take salt" as well as the common cod, but is smoked and dried sometimes. The annual yield in the United States is about 50,000,000 pounds, valued at $1,115,000. The spawning season lasts from January to June. See FISHERIES, and Plate of CODFISH AND ALLIES.

The name is also given in New England to various codlings of the genus *Urophycis*, as the squirrel hakes (*Urophycis chuss* and *tenuis*), but they are not of much value except for their sounds, or air bladders.

HAKE, EDWARD (fl.1579). An English satirist. He held a number of political offices in Windsor and from Oct. 10, 1588, till March 29, 1589, represented that town in Parliament. He was a stanch Puritan, and most of his works are satires directed against clerical and other abuses of the day. The best known is *Newes Out of Powles Churcheyarde*, which appeared in 1567. Probably no copy of this edition is now in existence, but a reprint was issued in 1579, and this has been reproduced among the *Isham Reprints* (1872). Many of Hake's other works either have been lost or are very rare.

HAKE, hä′ke, KARL VON (1768–1835). A German soldier, born at Flatow in Brandenburg. He began his military career as an ensign in the guards, took part in the battles connected with the French Revolution, in 1809 was appointed to a post in the War Ministry, and in 1810 became chief of the War Department. In 1813 he attracted much attention by his efficient preparations for war, subsequently commanded a brigade in Bülow's corps with rank of major general, and took a distinguished part in the battle of Waterloo. From 1819 to 1833 he was Minister of War, in which capacity he carried out important schemes of reorganization.

HAKE, THOMAS GORDON (1809–95). An English poet, called "the parable poet." He was born at Leeds, was educated at Christ's Hospital, and traveled on the Continent. He studied medicine and settled as practitioner in East Anglia, where he formed a friendship with George Borrow. Afterward he visited Canada and the United States and finally settled in London, where he became the physician and lifelong friend of Rossetti. His poems display marked originality and talent, but are frequently obscure, owing to their subtlety and symbolism. They comprise: *Poetic Lucubrations* (1828); *Madeline, with Other Poems and Parables* (1871); *Parables and Tales* (1872); *New Symbols* (1875), his best work; *Legends of the Morrow* (1878); *The Serpent Play, a Divine Pastoral* (1882). Consult *Select Poems*, ed. by Meynell with a portrait by Rossetti (London, 1894), and Hake, *Memoirs of Eighty Years* (ib., 1892).

HAKE'S DAME. The British codling. The term "hake" is used very confusingly. In the eastern United States the species of *Urophycis* are the fishes usually called hake, while the true hake (*Merluccius*) is known as silver hake, or whiting; and the corresponding species of England (*Phycis blennioides*) is called hake's dame, or forkbeard.

HAKE′WILL, GEORGE (1578–1649). An English clergyman and author. He studied at St. Alban Hall, Oxford, and afterward was elected a fellow of Exeter College. He was one of the two clergymen appointed in 1612 to preserve Prince Charles "from the inroads of popery." Boswell says that Johnson studied his writings for their style. His works include: *The Vanitie of the Eie. First beganne for the comfort of a gentlewoman bereaved of her sight and since upon occasion inlarged* (2d ed., 1608; 3d ed., 1615; and another impression, 1633); a Latin treatise against regicides (1612); and *Apologie . . . of the Power and Providence of God* (1627).

HAKIM IBN ALLAH, hä′kĭm ĭbn ål′lå, also called AL-MOKANNA (the veiled). Founder of a Mohammedan sect in the eighth century, and leader of a revolt against Mahdi, the third Abbaside Caliph (775–785 A.D.). He came from Merv in Khorassan and began his career as a private soldier, soon became captain, and subsequently headed a band of his own. In one of his fights he lost an eye and henceforth wore a veil. Hakim's religious teaching was that God enters the body of men at various times—e.g., Adam and Noah—and that He had entered his body. He claimed to perform miracles and is said on one occasion to have caused the moon to appear out of a wall; hence he is sometimes called "moon maker." His alleged miracles gained him numerous adherents, and with them he captured many strongholds. For a time the armies sent against him were defeated, but finally Mahdi dispatched Said al-Harashi, who took city after city and compelled Hakim to withdraw to Kash, where he was surrounded. In this predicament Hakim poisoned his soldiers and burned himself to death. The story of the veiled prophet has been put into poetical form by Moore in *Lalla Rookh.* Consult Weil, *Geschichte der islamitischen Völker* (Stuttgart, 1866), and Müller, *Der Islam im Morgen- und Abendland* (Berlin, 1885). See MOHAMMEDAN SECTS.

HAKKAS, häk′kaz (Chin., stranger families). An interesting class of people found in different provinces of southern China, but chiefly in Kwangsi, Kwangtung, Kiangsi, and Fukien, whence they have spread to Formosa, Hongkong, Hainan, and even to the Straits Settlements. Their origin is unknown, but for some unaccountable reason they appear to have been for centuries the object of the most persistent and inveterate hostility and persecution at the hands of the native, or *punti*, part of the population of the provinces in which they settled after their migrations from abodes farther north, chiefly Kwangtung. Hence they live in communities by themselves. In some districts they form the entire population, as in Kiayingchou, Kwangtung; in others they form two-thirds of the population. They are a hard-working, thrifty people, engaged in agriculture, and as quarrymen, stonemasons, porters, barbers, etc. In dress and in customs they differ from the Chinese. The women are handsome, do not bind their feet, and are not secluded like the Chinese women. Their language is a Chinese dialect which should be classed with the southern dialects (Canton, Fukien, etc.) inasmuch as in it the old finals *p*, *k*, and *t*, lost in the Mandarin dialect, are preserved.

Tradition and their family records and registers place them in Shantung and other northern parts of China about the middle of the third century B.C. It has been suggested that they may be the descendants of the aboriginal tribes found in northern China when the Chinese themselves arrived in the country from their original home.

They seem to have incurred the displeasure of the first universal Emperor of China (c.250 B.C.), and a bloody persecution followed, in which some of the clans were wiped out. The remnant fled to the mountains, whence most of them began their wanderings southward in search of a permanent home, but persecution met them everywhere. Sometimes they were permitted to settle down quietly and remain undisturbed for generations, as, e.g., under the Han dynasty, when some of them attained to high office—a circumstance, however, which led to fresh outbreaks, more slaughter, and renewed migrations. During the T'ang dynasty (seventh, eighth, and ninth centuries) they settled in the mountains of Fukien and the borders of Kwangtung, where they were when Kublai Khan and his Mongol armies undertook to conquer China. Large numbers of the Hakkas joined the Imperial army and fought for the native dynasty with the utmost bravery. During the disturbances incident to the expulsion of the Mongols and the establishment of the Ming dynasty (1368), fierce persecutions again broke out and large numbers moved to Kwangtung, whence smaller colonies have made their way into the adjoining regions. Kiayingchou, which is entirely Hakka, is noted for its scholars, many of whom compete successfully with the other Chinese in the public examinations. Hung Siuts'üan, the originator and leader of the Taiping Rebellion, and all his principal generals, were Hakkas.

Bibliography. The literature of the subject is not extensive, but is interesting. Consult: Eitel, "Ethnographical Sketches of the Hak-ka Chinese," in *Notes and Queries on China and Japan,* vol. i (Hong Kong, 1867, and reprinted in the *China Review,* vol. xxi, London, 1894–95); "An Outline History of the Hakkas," in *China Review,* vol. ii, and in the same volume, Pitou, "On the Origin and History of the Hakkas" (London, 1873–74); Lechler, "The Hakka Chinese," in *Chinese Recorder* (Shanghai, 1878); Dyer Ball, *Easy Sentences in the Hakka* (2d ed.) and *Hakka Made Easy* (Hongkong, 1896); id., *Things Chinese* (4th ed., New York, 1904); *First Lessons in Reading and Writing the Hakka Colloquial* (Basel, 1869); Schaub, "Proverbs in Daily Use among the Hakkas," in *China Review,* vol. xxi (London, 1894–95); S. H. Schaank, *Het Loeh-Foeng Dialect* (Leiden, 1897); Vömel, *Der Hakkadialekt* (Foung Pai, Leiden, 1913); MacIver, *An English-Chinese Dictionary in the Vernacular of the Hakka People* (Shanghai, 1905).

HAKLUYT, hăk′lo͞ot, RICHARD (c.1553–1616). An English writer on geography and history. After some preparation at Westminster School, he entered Christ Church College, Oxford, in 1570 and graduated A.B. in 1574, and A.M. in 1577. Soon after receiving the latter degree he was delivering public lectures on geography and the construction and use of maps, spheres, and nautical instruments. In 1582 he published *Divers Voyages Touching the Discovery of America,* which attracted considerable attention and probably secúred his appointment as chaplain to the English Ambassador at Paris in 1583. There he collected all available information respecting French and Spanish voyages, and in 1584 wrote *A Particular Discourse Concerning Western Discoveries,* first printed in 1877, in the collections of the Maine Historical Society. In 1587 he published a translation of the journal of the French explorer René de Laudonnière. The following year he returned to England and busied himself in preparing for publication his *Principall Navigations, Voiages, and Discoveries of the English Nation.* This appeared in one volume in 1589, but it met with such popular success that Hakluyt proceeded to collect material for a new and enlarged edition, which was published in three volumes in London in 1598–1600. In 1602 Hakluyt was made prebendary of Westminster and in the following year archdeacon. He lent his influence to solicit a patent for the colonizing of Virginia from the King and was one of the adventurers in the London or South Virginia Company. Besides his published works, he left a large collection of manuscripts. Hakluyt's *Voyages* were reprinted in 1809–12, in rearranged form by Edmund Goldsmith at Edinburgh in 1889–90, and in London, 12 volumes, in 1904–06. His best monument is the society that bears his name. Consult an account of Hakluyt in the introduction by J. W. Jones to the society's edition of the *Divers Voyages Touching the Discovery of America* (London, 1850); also an article by Froude in *Short Studies on Great Subjects,* vol. i (ib., 1867); and *Voyages of Elizabethan Seamen: Select Narratives from Hakluyt's Principal Navigations,* edited by Payne (Oxford, 1893, 1900). See HAKLUYT SOCIETY.

HAKLUYT, RICHARD, "of the Middle Temple" (about 1580), a cousin of Richard Hakluyt. He was exceedingly influential in arousing English interest in the colonization of the New World. It was, indeed, at his lodgings and as a result of conversations with him that his cousin received the inspiration which has made their name synonymous with the history of the beginnings of Greater Britain. In 1585 he drew up some extremely valuable "Inducements" for those who were contemplating the voyage to America, and two years later he was among those chiefly instrumental in sending Frobisher to the Northwest. From 1578 onward he was in constant communication with nearly every adventurer who made the American voyage, and his correspondence, preserved by his cousin, furnishes many important details regarding these early undertakings. There are many evidences that his sound judgment and wise counsel gave him a leading position among the English Imperialists of his generation.

HAKLUYT SOCIETY. An association, named for Richard Hakluyt and organized in December, 1846, for the purpose of "printing and distributing among its members the most rare and valuable voyages, travels, and geographical records, from an early period of exploratory enterprise to the circumnavigation of Dampier." Between 1847 and 1913, 165 volumes were issued under the editorial supervision of eminent authorities in geographical science, containing original or contemporary accounts of travels and exploration in all parts of the world. Notable publications were: *Select Letters of Columbus* (1849 and 1870); Raleigh's *Guiana* (1848); Hakluyt's *Divers Voyages* (1850); Galvano's *Discoveries of the World* (1862);

Garcilasso de la Vega's *Royal Commentaries of the Incas* (1869 and 1871); Pigafetta's account of Magellan's voyage (1874); *The Observations of Sir Richard Hawkins* (1877); *Commentaries of the Great Alfonso Dalboquerque* (4 vols., 1870–84); *The Journal of Christopher Columbus* (1893); *The Letters of Amerigo Vespucci* (1894); *Danish Arctic Expedition* (1897); *Early Dutch and English Voyages to Spitzbergen in the Seventeenth Century* (1904).

HAKODATE, hä′kō-dä′tȧ, or **HAKODADI,** hä′kō-dä′dē. The northernmost of the old treaty ports of Japan, opened in 1859, situated at the south end of the island of Yezo (Map: Japan, G 3). It lies at the foot of a bald rock and has a fortified and extensive, almost landlocked, harbor. It is a well-built, well-kept town, but of little architectural interest. The chief buildings are the Japanese Club, the town hall, and the naval school. There is also an American mission school. It has water works and a tram line and is connected with Tokyo by telegraph. The total length of railways in the Hokkaido District is 900 miles. The commerce of the port is steadily increasing—in 1912, imports, $176,115, and exports, $1,336,560; total, $1,512,675. Exports consist mainly of fisheries products, charcoal, sulphur, and timber. Pop. (est.), 90,000, with about 400 foreigners. Hakodate was almost destroyed by fire in 1907, which caused a loss of 50,000,000 yen. The city was rapidly rebuilt, with many permanent improvements.

HAKON, hạ′kōn. The name of several kings of Norway. See Haakon.

HAL, häl. A town of Belgium, in the Province of South Brabant, on the river Senne and the Charleroi Canal, 9 miles southwest of Brussels (Map: Belgium, C 4). The fourteenth-century church of St. Mary, formerly dedicated to St. Martin, is a pure Gothic edifice, containing a miraculous wooden image of the Virgin and visited on that account by numerous pilgrims. The town has an episcopal institute and manufactures of paper, porcelain, and other articles. Pop., 1900, 12,284; 1910, 14,305.

HALACHA, hȧ-lä′kȧ (Heb., rule of procedure, from *halak,* to go). The general term for the Jewish oral law, which runs parallel with the written law contained in the Bible and is supposed to be, like this, of divine origin. Its relation to the ordinances contained in the Pentateuch is that of an amplified code to the fundamental religious and civil maxims. The theory being that the oral law was handed down through a long chain of highest authorities (Sinaitic revelation, Moses, Joshua, elders, Great Synagogue [Ezra], etc.), it could only be treated and further developed by the foremost men of each generation, who through their eminence in learning belonged to a kind of aristocracy of mind (*hakamin,* wise men), towering above the multitude (*hediotim,* laymen). Their decision on all ordinances involved in contradictory traditions was final, because it was believed to spring from a deeper apprehension of Scripture. An elaborate system of interpretation of the biblical texts was devised, which, frequently sacrificing the spirit to the letter, attached great weight to certain special letters, words, and even signs in the Old Testament, which, seemingly superfluous where they stood, were supposed to point to the injunction under discussion. Halacha embraces the whole field of juridicopolitical, religious, and practical life, down to its most minute and insignificant details. Originally, as already said, the oral law par excellence, it began to be written down when, as was natural, various opinions and traditions arose as to the correct practice, and the danger of sectarianism was imminent. The first collection of laws was instituted by Hillel, Akiba, and Simon ben Gamaliel; but the final redaction of the general code, the *Mishna* (q.v.), is due to Jehudah Hanasi, about 220 A.D. Elements of this oral law that did not find a place in the Mishna are called *Baraithas* and have been preserved in the Talmud; others are found in the *Tosephtas.* Of an earlier date with respect to their contents, but committed to writing in later times, are the three Haggadic books (Midrashim): *Siphra,* or *Torath Kohanim* (a Haggadic amplification of Leviticus), *Siphre* (of Numbers and Deuteronomy), and *Mechiltha* (of a portion of Exodus). The rabbis of the Mishnaic period are called the *Tanaim.* These were followed by the *Amoraim,* who, by discussing and further amplifying the Mishna, became the authors of the Gemara (q.v.). The Halacha was further developed in subsequent centuries by the Saboraim, Geonim, and the authorities of each generation. See Haggada; Midrash; Talmud.

HALAE SAXONUM. See Halle.

HALAS, hŏ′lŏsh, or Kis-Kun Halas. A town of Hungary, situated near the Lake of Halas, in the County of Pest-Pilis-Solt-Kis-Kun, about 80 miles south-southeast of Budapest (Map: Hungary, F 3). The chief industry is agriculture and the cultivation of the vine. Pop., 1900, 19,866; 1910, 24,381.

HALBE, häl′be, Max (1865–). A German dramatist, born in Guettland, near Danzig, and educated at the universities of Heidelberg, Berlin, and Munich. With Hauptmann and Hartleben (qq.v.), he was connected with the founding of the Berlin Freie Bühne in 1889; and in Munich in 1895 he was one of the founders of the Intimes Theater für dramatische Experimente. His dramatic work was strongly influenced by Ibsen and Hauptmann, but has much original strength. His principal plays are: *Ein Emporkömmling* (1889), a study of a self-made man and his son; *Freie Liebe* (1890; 2d ed., 1903); *Eisgang* (1892); *Der Amerikafahrer* (1894); *Jugend* (1893; 25th thousand, 1911), which, with *Mutter Erde* (1897; 6th ed., 1906), is probably his best-known work; *Ein Meteor* (1900); *Haus Rosenhagen* (1901; Eng. trans., in *Poet Lore,* vol. xxi, 1910); *Der Strom* (1904); *Die Insel der Seligen* (1905), a comedy; *Der Ring des Gauklers* (1911); *Freiheit* (1913). He wrote some fiction also: *Frau Meseck* (1897); *Der Ring des Lebens* (1909; 4th thousand, 1910), a collection of stories; *Die Tat des Dietrich Stobäus* (1910; 5th thousand, 1911). Consult the sketch by Grumann in *Poet Lore,* vol. xxiii (Boston, 1912).

HALBERD, hăl′bērd, or **HALBARD** (from OF. *halebarde,* Fr. *hallebarde,* Ger. *Hellebarte,* from MHG. *helmbarte,* halberd, from *helm, halm,* Ger. *Helm,* handle, AS., Eng. *helm,* tiller + MHG. *barte,* Ger. *Barte,* axe; connected also with OHG. *bart,* Ger. *Bart,* AS., Eng. *beard*). A weapon employed in mediæval warfare, consisting originally of an axe blade balanced by a pick and having a pike head at the end of the 6-foot shaft; but there were many different forms, and some were highly ornamented and bore little resemblance to an axe or pike. It was used by the Germans, Swiss, and Danes previous to the thirteenth century and up to the sixteenth century was borne by sergeants of foot and artillery and companies of so-called halberdiers. The "huscarles" of Canute were armed with the halberd. The Swiss were the first to change from the halberd to the pike and similar weapons. In the famous battle of Morat (1476), in which the Swiss overthrew Charles the Bold of Burgundy, halberds and pikes were used by the former. The English used the halberd previous to the Tudor period, but, as it was an expensive weapon, the halberdiers were restricted to a select corps for the protection of the "colors." In France the halberd was very little used. Consult Ashdown, *Arms and Armour* (New York, 1909).

HALBERSTADT, häl′bẽr-shtȧt. An episcopal city, capital of the district of the same name in the Prussian Province of Saxony, situated on the Holzemme, 28 miles southwest of Madgeburg (Map: Germany, D 3). It is an ancient town with some fine specimens of fifteenth and sixteenth century wood architecture. On the Dom-platz, a large central square, the cathedral of St. Stephen, rebuilt after the fire of 1179 and restored in 1871, is a magnificent structure of the early Gothic style, with good reliefs, wood sculptures of the thirteenth century, a number of pictures, and many antiquities in its treasury. Opposite it the church of Our Lady, constructed in 1146, contains fine reliefs and mural paintings. Other buildings are the town hall, a Gothic structure of the fourteenth century, and the market. Halberstadt has a Gymnasium founded in the ninth century, a teachers' seminary, two fine libraries (one with 40,000 volumes), a collection of portraits by Gleim, a number of private collections of paintings, coins, and antiquities, and a theatre. The manufactures of the town comprise sugar, spirits, beer, cigars, leather, soap, bagging, rubber goods, paper, machinery, and gloves. It has also large railway shops. Halberstadt became the seat of a bishopric as early as 804 and obtained municipal rights at the end of the tenth century. The bishopric of Halberstadt was secularized in 1648 and given as a principality to Brandenburg. Pop., 1900, 42,810; 1910, 46,481.

HALBERTSMA, hȧl′bẽrt-smä, Tjalling (1841–). A Dutch gynæcologist, born at Sneek. He studied medicine at Leyden (1858–63), where he received his degree, and then at Tübingen, Vienna, and Paris. He was professor at Groningen (1866–67) and then went to the University of Utrecht. Besides many contributions to medical journals in Holland and abroad, and an essay on English contributions to gynæcology (1867), Halbertsma wrote: *Ovariotomie* (1873); *Craniotomie* (1874); *Ueber die Aetiologie der Eclampsia Puerperalis* (1882).

HALBIG, häl′bĭk, Johann (1814–82). A German sculptor. He was born at Donnersdorf in Lower Franconia and was educated at the Polytechnic School and at the Academy of Fine Arts in Munich. In 1845 he was appointed professor of sculpture in the Polytechnic Institute, Munich, in which city is a great part of his work. His most notable production is the colossal group of a quadriga and lions on the triumphal arch (1847). He also carved the lions of the Pinakothek and statues of Roma and Minerva in the palace gardens. He made 18 colossal statues representing the leading German provinces of Kehlheim; 60 busts for the Pinakothek (Munich); a statue of King Maximilian II for Lindau (1854); a monument of Platen at Ansbach (1858); the monument of Marshal Cachahiba d'Argolo in Bahía, Brazil; a statue of King Louis I for Kehlheim. Among the most important of his later works are a statue of Frauenhofer in Munich (1866); an equestrian statue of King William I of Württemberg for Cannstatt (1876); the "Emancipation" group of sculpture in New York (1867–68); and the "Passion" group at Oberammergau (1875). His work is characterized by its decorative quality, is carefully executed, and true to nature.

HAL′CYON DAYS (Lat. *halcyon*, influenced by popular confusion with Gk. ἅλs, *hals*, salt + *κύειν*, *kyein*, to conceive, from Gk. ἀλκυών, *alkyōn*, ἁλκυών, *halkyōn*, kingfisher; connected with Lat. *alcedo*, kingfisher). A name given by the ancients to the seven days which precede and the seven days which follow the shortest day of the year. The reference is to a fable that during this time, while the halcyon bird or kingfisher was breeding, there always prevailed calms at sea. From this the phrase "halycon days" has come to signify times of peace and tranquillity.

HALCYONE, hăl-sī′ȯ-nē̇. A Greek divinity. See Alcyone.

HALDANE, ha̤l′dān, James Alexander (1768–1851). A Scottish clergyman, brother of Robert Haldane (q.v.). He was born at Dundee and educated at Edinburgh University. After some years on the sea he retired with his wife to Edinburgh (1794) in order to devote himself to religious work. He distributed tracts, organized Sabbath schools, and preached extensively in the villages and large towns of Scotland. He left the Church of Scotland in 1799 and founded a Congregational church in Edinburgh, the first in Scotland, and was ordained pastor. From 1801 till his death in Edinburgh, Feb. 8, 1851, he acted as pastor of Leith Walk Tabernacle, Edinburgh, without salary. In 1808 he embraced Baptist sentiments, a change which split the Scottish Congregational body. He wrote several controversial works against the Irvingites, Erskine of Linlathen, and others; also *Early Instruction Commended in a Narrative of Catherine Haldane* (his daughter, who died at the age of six), with an *Address to Parents on the Importance of Religion* (12th ed., 1801); *The Atonement* (1845; 5th ed., 1877); *An Exposition of Galatians* (1848). For his life, consult Alexander Haldane, *Memoirs, etc.* (London, 1852).

HALDANE, John Scott (1860–). A British physiologist. He was born in Edinburgh, was educated at the University of Edinburgh and at Jena, and became fellow of New College, Oxford, and university reader in physiology. He was founder and joint editor of the *Journal of Hygiene,* wrote much on the physiology of respiration, and served on royal commissions, etc., on colliery explosions, deep-diving work (attaining a depth of 210 feet), and other questions of public health related to respiration. He devised the method of estimating the volume of the blood from its oxygen capacity.

HALDANE, Richard Burdon Haldane, first Viscount (1856–). A British statesman and philosophical writer, grand-nephew of Robert and J. A. Haldane, born at Cloanden, Perthshire. He was educated at the universities of Edinburgh and Göttingen, was called to the bar in 1879, and became queen's counsel in

1890. He was Gifford lecturer at St. Andrews University in 1902–04 and became rector of Edinburgh University in 1905. He wrote *Life of Adam Smith;* a translation of Schopenhauer's *World as Will and Idea; Education and Empire* (1902); *The Pathway to Reality* (1903); *The Conduct of Life, and other Addresses* (1914). He entered on his political career in 1885 as member of the House of Commons for Haddingtonshire, for which he was continuously returned, the last time in 1910. He was Secretary for War in 1905–12, was created Viscount in 1911, and became Lord High Chancellor in 1912. In 1913 he spoke before the American Bar Association at Montreal, Canada, and was the first Lord Chancellor to visit the United States while in office; his address was published in 1914 as *The Higher Nationality.*

HALDANE, Robert (1764–1842). A philanthropist and preacher, brother of James Alexander Haldane. He was born Feb. 28, 1764, in London. He inherited a large property, but, having a passion for the sea, after studying but a short time in Edinburgh University, he entered the navy, where he served with honor (1780–83). He had high hopes of social reform from the French Revolution, but was disappointed in its outcome. Meantime he had become profoundly interested in religion and resolved to devote his life and fortune to its advancement, and in 1796 he selected India as a field for missionary operations; but as the East India Company refused to sanction the enterprise, it had to be given up. He then resolved to work at home. In company with Rowland Hill and others, he was very successful in awakening throughout Scotland a deep interest in the subject of religion. The unusual methods of work which they adopted excited the opposition of the Scottish General Assembly. Field preaching was forbidden, and other features of the revival were disapproved. Haldane seceded from the Established church (1799) and entered the Congregational body, and at his own cost erected tabernacles for public worship in many of the large towns of Scotland. In 1808 he adopted Baptist views, engaged in personal labors to promote religion in the south of France and in Switzerland (1816), and in 1817 removed to Montauban. By his work in Geneva a new impulse was given to evangelical Christianity, and an important theological school was established. In 1819 he returned to Scotland. Previously (1798) his attention had been directed to missionary work in Africa, and, as a beginning, he had 30 children brought to England from Sierra Leone to be educated. He wrote: *The Evidence and Authority of Divine Revelation* (1816; 2d ed., 1834); *The Books of the Old and New Testament Proved to be Canonical, and their Verbal Inspiration Maintained and Established* (1830; 7th ed., 1877); *Exposition of Romans* (1835; 2d ed., 1874). For his life, consult Alexander Haldane, *Memoirs, etc.* (London, 1852).

HALDEMAN, häl′de-mȧn, Bruce (1862–). An American newspaper publisher. He was born at Knoxville, Tenn., and was educated at the University of Virginia. From 1885 to 1895 he served in various capacities from reporter to managing editor of the Louisville *Courier Journal* and the Louisville *Times.* In 1902 he became president of the companies publishing these two papers and in 1910 he was elected president of the American Newpapers Publishers' Association.

HALDEMAN, Samuel Stehman (1812–80). An American naturalist and philologist, born at Locust Grove, Lancaster Co., Pa. He studied for two years at Dickinson College, was made assistant in the Geological Survey of New Jersey in 1836, and from 1837 to 1842 was engaged in similar service in Pennsylvania. He became professor of the natural sciences at the University of Pennsylvania in 1851 and in 1855 was called to a similar chair in Delaware College. From 1869 until his death he was professor of comparative linguistics in the University of Pennsylvania, he being the first to occupy the chair in that institution, and during this period made a careful study of Indian dialects. In 1876 he was elected president of the American Philological Association. In addition to numerous papers on scientific and philological subjects, he published: *Elements of Latin Pronunciation* (1851); *Taylor's Statistics on Coal* (2d ed., 1855); *Analytical Orthography: An Investigation of the Sounds of the Voice and their Alphabetic Notation* (1860); *Tours of a Chess Knight* (1864); *Affixes in their Origin and Application, Exhibiting the Etymologic Structure of English Words* (1865); *Pennsylvania Dutch* (1872); *Outlines of Etymology* (1877); *Word Building* (1881).

HAL′DIMAND, Sir Frederick (1718–91). A British soldier and administrator. He was born in the Canton of Neuchâtel, Switzerland, Aug. 11, 1718, and was early in the Sardinian army and under Frederick the Great. But he was in the Swiss Guard at The Hague in 1756, when, together with his friend and fellow countryman, Col. Henry Bouquet, he went to the British Colonies in America. During the French and Indian War he commanded, under Lord Loudoun, a regiment of Germans, Swiss, and other foreigners. They called themselves the Royal Americans. Haldimand successfully defended Oswego and thus saved Niagara (in 1759), was with General Amherst at the capitulation of Montreal (1760), was military governor at Three Rivers, for six years was in charge of the English garrison at Pensacola, Fla. (1767–73), and then in command at New York for about a year during Gage's leave of absence. He supported that general through the siege of Boston and was recalled to advise the British ministry upon American affairs, but was sent out again as Governor of Canada (1778–84). General Haldimand held down with a firm hand the French-Canadian sympathizers with the American Revolution and welcomed and cared for the many thousands of Loyalists who sought refuge in Canada during and after the war. He represented Great Britain in the Vermont negotiations with the Allens and others, and he left behind him a mass of most valuable official correspondence relating thereto, as well as to the general history of America for the latter half of the eighteenth century. These papers, called the Haldimand collection, were bequeathed to the British Museum by Sir Frederick's grandnephew (1858), and have recently been copied for the Dominion Archives at Ottawa. Sir Frederick died in his native land, June 5, 1791. Consult McIlwraith, *Sir Frederick Haldimand* (Toronto, 1904).

HALE, Benjamin (1797–1863). An American educator. He was born at Newbury, Mass., graduated at Bowdoin College (1818), studied theology at Andover, and entered the Congregational ministry in 1822. The next year he became a tutor at Bowdoin and from 1827 to 1835 was professor of chemistry and mineralogy at Dartmouth. In 1828 he was ordained to the priesthood of the Protestant Episcopal church. From 1836 to 1858 he was president of Geneva (now Hobart) College. He published: *Scriptural Illustrations of the Liturgy* (1835); *Liberty and Law* (1838); *Education in its Relations to a Free Government* (1838). Consult Douglass, *Life of Benjamin Hale* (1883).

HALE, Charles Reuben (1837–1900). An American Protestant Episcopal bishop, born at Lewiston, Pa. He graduated at the University of Pennsylvania (1858), was a chaplain in the Union army (1863), and after varied service in Pennsylvania, New York, and Maryland became dean of Davenport, Iowa (1886), and Assistant Bishop of Springfield (1892), with the title of Bishop of Cairo. A High-Churchman in his theology, Bishop Hale was a prominent sympathizer with the Greek church; was secretary to the Russo-Greek Committee in 1871, and acted as clerk to the Commission on Correspondence with the hierarchs of the Eastern churches and of the Old Catholics (1874). His writings include: *A List of All the Secs and Bishops of the Holy Orthodox Church of the East* (1872); *The Mozarabic Liturgy, and the Mexican Church* (1876); *Russian Missions in China and Japan* (1878); *Order for Holy Communion, Arranged from the Mozarabic Liturgy* (1879); *The Universal Episcopate* (1882); *A Visit to the Eastern Churches in the Interest of Church Unity* (1886); *The American Church and Methodism* (1889).

HALE, Edward Everett (1822–1909). An American author, philanthropist, and Unitarian clergyman, son of Nathan Hale (1784–1863). He was born in Boston, Mass., April 3, 1822, was educated at the Boston Latin School, graduated at Harvard in 1839, and received an honorary degree 40 years later. After a short period of tutoring he studied theology and was pastor of the church of the Unity at Worcester from 1846 to 1856. He then became pastor at the South Congregational Church of Boston and took an active interest in all the philanthropic movements of his city and time. He became pastor emeritus of this church in 1901 and in 1903 was appointed chaplain of the United States Senate. He was a member of the National Academy of Arts and Letters. A collected edition of his works, in 10 volumes, was completed in 1901, but it represents only a small portion of his literary work. He contributed voluminously to magazines and newspapers and edited several of them; e.g., the *Christian Examiner*, and *Old and New* (1869–75), a magazine of which he was founder, and which finally was merged into *Scribner's Monthly*. He also took great interest in history and especially in Spanish-American affairs, contributed to Winsor's great coöperative histories, edited Lingard's *England* (1853), and wrote a *Chautauquan History of the United States* (1887); a *Life of Washington* (1887); *Franklin in France*, with his son, E. E. Hale, Jr. (1887–88); and other kindred works. With his sister, Susan Hale, he wrote several volumes of travels. In *A New England Boyhood* (1893) and in *James Russell Lowell and his Friends* (1889), he gave his reminiscences of New England and New Englanders of the past. But he is perhaps best known for his fiction, and especially for one short story, the famous and effective *Man Without a Country*, published anonymously in the *Atlantic Monthly* in 1863. Another short story, *My Double, and How He Undid Me*, published in the same periodical in 1859, also attracted great attention. But his most influential book is his *Ten Times One is Ten* (1870), which, with *In His Name* (1873), led to the formation of many charitable organizations—Lend-a-Hand clubs, King's Daughters, etc. He wrote also *Kansas and Nebraska* (1854); *If, Yes, and Perhaps* (1868); *The Ingham Papers* (1869); *His Level Best and Other Stories* (1870); *Sybaris and Other Homes* (1871); *Philip Nolan's Friends* (1876), a romance of the early Southwest; *The Kingdom of God* (1880); *Christmas at Narragansett* (1885); *East and West* (1892); *For Fifty Years* (1893), poems; *Ralph Waldo Emerson* (1899). His *Memories of a Hundred Years* appeared in 1902; *We, the People* (1903); *Prayers in the Senate* (1904); *Foundations of the Republic* (1906). He died at Roxbury, Mass., June 10, 1909. No adequate biography of him has been written. Consult: *Works* (10 vols., Boston, 1899–1901); A. S. Garver, in *American Antiquarian Society Proceedings*, vol. xx, pp. 60–69 (Worcester, 1909); H. C. Vedder, *American Writers of To-day* (New York, 1910).

HALE, Edward Everett, Jr. (1863–). An American writer and professor of English, son of Edward Everett Hale. He was born in Boston and graduated from Harvard University in 1883 and as Ph.D. from the University of Halle in 1892. He was instructor and assistant professor of English at Cornell University in 1886–90, fellow at Harvard in 1890–92, and professor of English at the Iowa State College in 1892–95. In 1895 he accepted the chair of English at Union College. Besides editing college and school texts and contributing to the *Dial* after 1893, he published: *Constructive Rhetoric* (1896); *James Russell Lowell* (1899); *Dramatists of To-day* (1905; 6th ed., 1911); *Seward* (1910); and contributed to the New International Encyclopædia.

HALE, Eugene (1836–). An American legislator, born at Turner, Me. He studied law at Portland and was admitted to the bar in 1857. He was sent to the Maine Legislature in 1867, thence to the Forty-first Congress in 1868, and was four times reëlected. During his congressional career he served on the Committee on Appropriations and during his last term was chairman of the Republican Congressional Committee. Hale was a delegate to the Republican conventions of 1868, 1876, and 1880, and strongly urged the nomination of Blaine in the last two. He declined the Post-office portfolio in Grant's second cabinet (1874), and, after service in Grant's "private commission" for the canvass of the presidential vote in Louisiana (1876), refused the post of Secretary of the Navy offered him by President Hayes in 1877. In 1871 he married Mary Chandler, daughter of Senator Chandler, of Michigan. He was elected to the Senate in 1881 to succeed Hannibal Hamlin and was reëlected for four successive terms. During the first two years of President Taft's administration he, with Senator Aldrich, was majority leader of the Senate. He retired in 1911, after a longer service than that of any other Senator then in office.

HALE, George Ellery (1868–). An American astronomer, born in Chicago. He was educated at Massachusetts Institute of Technology (1890), at the Observatory of Harvard

College (1889–90), and at Berlin (1893–94). In 1890 he was appointed director of the Kenwood Astrophysical Observatory. He was professor of Astrophysics at Beloit College (1891–93), associate professor at the University of Chicago until 1897, and full professor (1897–1905). He was director of the Yerkes Observatory in 1895–1905, and became director of the Solar Observatory of the Carnegie Institution at Mount Wilson, Cal., in 1904. Hale made special study of spectroscopy and invented the spectroheliograph, with which he made his discoveries of the solar vortices and magnetic fields of sun spots. He was coeditor of *Astronomy and Astrophysics* in 1892–95 and after 1895 editor of the *Astrophysical Journal*, in which he published the results of much of his work. He is also author of many numbers of the *Contributions* of the Mount Wilson Observatory.

HALE, Horatio (1817–96). An American ethnologist. He was born in Newport, N. H., the son of Mrs. Sarah J. Hale (q.v.), graduated at Harvard in 1837, and accompanied, as philologist, the United States exploring expedition under Wilkes. He made a careful study of the languages and customs of the Pacific islands and published the results of his investigations in his *Ethnography and Philology* (1846). After his return he made a study of the Indians of Canada. He studied in Europe (1846–55), and in the latter year was admitted to the Chicago bar, but soon removed to Clinton, Ontario, where he resided until his death. He was a member of many learned societies and in 1886 was president of the anthropology section of the American Association for the Advancement of Science. His writings include: *Indian Migrations as Evidenced by Language* (1883); *The Iroquois Book of Rites* (1883); *The Development of Language* (1888).

HALE, John Parker (1806–73). An American statesman and orator, born in Rochester, N. H. He studied at Phillips Exeter Academy, graduated at Bowdoin College in 1827, and three years later was admitted to the bar. His political career began in 1832, when, as a strong Jacksonian Democrat, he was elected to the New Hampshire State Legislature. In 1834 he was appointed by President Jackson United States district attorney for New Hampshire, was reappointed by Van Buren in 1838, and served until removed by Tyler in 1841. His nomination and election to Congress in 1842 followed naturally. Once in Congress, however, he soon asserted his independence and spoke and voted against the adoption of the "gag rule" (q.v.), intended to put a stop to antislavery petitions. He still remained a stanch Democrat, however, supported Polk and Dallas in the campaign of 1844, and was renominated without opposition. Before the congressional election, however, Texan annexation having been adopted by the Democratic party as one of the main features of its programme, the New Hampshire Legislature, in December, 1844, passed resolutions instructing its Senators and Congressmen to favor that policy. Hale, however, came out with a public statement opposing annexation on antislavery grounds. The Democratic State Convention was thereupon hastily reassembled at Concord. Hale was branded as a traitor to the party, and his name was stricken from the ticket. In the subsequent election he ran as an independent candidate, and as neither he, the regular candidate, nor the Whig candidate obtained a majority of the votes cast, the district was unrepresented. In the face of an apparently invincible Democratic majority, he set out to win the State over to the antislavery cause, addressed meetings in every town and village in New Hampshire, carrying on a remarkable canvass known as the "Hale Storm of 1845," and was rewarded with seeing the State choose a Legislature in which the Whigs and Independent Democrats had a majority of the votes. He himself was elected to the Lower House and was chosen Speaker and in 1847 was elected to the United States Senate. True to his convictions, he alone refused to vote in favor of the resolution tendering the thanks of Congress to Scott and Taylor for their victories in the Mexican War. In 1849 he was joined in the Senate by Chase and Seward, and in 1851 by Sumner, as coadvocates of the antislavery cause. He was nominated for the presidency by the Liberty party in October, 1847, but withdrew in favor of Van Buren, whom he supported in the campaign of 1848. In 1851 he was counsel for the rescuers of the slave Shadrach in Boston. At the national convention of Free Soil Democrats, held at Pittsburgh in 1852, Hale was nominated for President, and George W. Julian, of Indiana, for Vice President. The ticket polled 157,685 votes. At the expiration of his senatorial term in 1853, Hale was succeeded by Charles G. Atherton; but after two years, which he spent in law practice in New York, the Legislature of New Hampshire having again an antislavery majority, he was elected to fill the vacancy caused by Senator Atherton's death. In 1858 he was reëlected, as a Republican, for a full term and served until 1865, completing, in all, a service of 16 years in the Senate. During the Civil War he consistently supported President Lincoln's policy, and upon his retirement from the Senate he was appointed Minister to Spain, where he remained for four years.

HALE, Sir Matthew (1609–76). A distinguished English lawyer and judge, born at Alderley in Gloucestershire, Nov. 1, 1609. His paternal grandfather was a wealthy tradesman, while his mother was a member of the noble family of Poyntz of Acton. Left an orphan at the age of five, he was placed under the care of the Puritan vicar of Wotton-under-Edge, who prepared him for college. He entered Magdalen Hall, Oxford, at 16; at the age of 20 he was enrolled as a member of Lincoln's Inn and entered upon the study of the law with great zeal and industry. During this period he is said to have worked 16 hours a day, reading and rereading all the yearbooks, reports, and law treatises in print, delving into the records of the Tower of London and other repositories of antiquarian law. He also devoted considerable time to investigations in Roman law, in mathematics, in physics, chemistry, history, philosophy, medicine, and theology. Called to the bar in 1637, he quickly gained a large practice and soon became prominent also in public affairs. While a Puritan in principle, he was not a partisan by nature, nor was he an antiroyalist. As long as possible he maintained a position of neutrality between the opposing factions in the state. Upon the triumph of the Parliamentary party under Cromwell he signed the Solemn League and Covenant, sat in the Assembly of Divines at Westminster, labored to bring about a settlement between the King and Parliament, and after the execution of Charles I threw in his lot with the Commonwealth. Although, as a member of the Commons, he spoke in favor of subordinating "the single person" to Parliament, the Protector made him a judge of the Court of Common Pleas in 1653. He declined a reappointment by Richard Cromwell. Having taken an active part in the restoration of Charles II, that monarch appointed him Chief Baron of the Exchequer in 1660 and made him Knight. Eleven years later Hale was made Chief Justice of the King's Bench, the then highest judicial office in England—a position which he held until failing health forced him to resign in February, 1676. Upon his withdrawal from public life he retired to his native Alderley, where he died the following Christmas.

Hale's fame as a lawyer and a judge is very great. Lord Campbell accounts him "the most eminent judge who ever filled the office of Chief Baron." His authority upon legal questions was deemed well-nigh infallible during the latter years of his life. His *Analysis of the Law* furnished Blackstone with an outline for his Commentaries. The other legal publications of Sir Matthew Hale which are most highly esteemed are: *De Jure Maris; Commentary to Fitzherbert's Natura Brevium; A History of the Common law.* He bequeathed many valuable manuscripts to Lincoln's Inn, where they are still treasured. Consult: Burnet, *Life and Death of Sir Matthew Hale* (London, 1682); Williams, *Life of Hale* (ib., 1835); Campbell, *Lives of the Chief Justices* (Boston, 1873); *Dictionary of National Biography*, vol. xxiv (London, 1890).

HALE, Nathan (1755–76). A Revolutionary patriot, who met his death under circumstances that have made him famous in American history. He was born at Coventry, Conn., June 6, 1755, graduated with high honors at Yale in 1773, taught school at East Haddam from October, 1773, to March, 1774, and afterward at New London until soon after the outbreak of the Revolutionary War, when (July 1, 1775) he became first lieutenant in a Connecticut regiment, commanded by Charles Webb. For a short time he was engaged on recruiting duty at New London, then served at the siege of Boston, and on September 1 became a captain lieutenant. On Jan. 1, 1776, he was formally commissioned a captain in the regular continental service. In March, 1776, he started with Heath's brigade for New York, where soon afterward (according to a doubtful tradition) he, with several picked men, captured by night a British provision sloop protected by the man-of-war *Asia*. While in the vicinity of New York he served as a member of a small harassing body known as Knowlton's Rangers. Early in September he volunteered to visit Long Island and New York, to secure some much-needed information concerning the enemy. Entering the British lines disguised as a Dutch school-teacher, he obtained the desired information and was about to return, when, on the night of September 21, he was recognized and captured. On the following morning he was hanged as a spy, having previously, it is said, been denied the use of a Bible or a visit from a minister, and having had the letters which he had written to his mother and his fiancée destroyed before his eyes. His last words were: "I only regret that I have but one life to lose for my country." There are statues of Hale in Hartford, Conn., and in City Hall Park, New York—the former by Gerhardt and the latter by Macmonnies. The best biography is that by Johnston (New York, 1901). Consult also: Lossing, *The Two Spies, Nathan Hale and John André* (ib., 1886); Brown, *Nathan Hale, the Martyr Spy* (ib., 1899); Holloway, *Nathan Hale, the Martyr Hero* (ib., 1899); W. O. Partridge, *Nathan Hale, The Ideal Patriot* (ib., 1902).

HALE, Nathan (1784–1863). An American journalist, the nephew of Nathan Hale the patriot, and the father of the Rev. Dr. Edward Everett Hale. He was born at Westhampton, Mass., graduated at Williams College in 1804, studied law, and in 1810 was admitted to the bar in Boston. In 1814, with Henry D. Sedgwick, he began to edit the *Weekly Messenger*. In the same year Hale also bought the Boston *Daily Advertiser*, the first daily journal in New England. By means of it he first introduced regular editorial comment as a feature of American journalism. He is also credited with having been the first newspaper publisher in New England to adopt steam power presses. The *Advertiser* was originally Federalist in politics, and when that party went out of existence naturally gave its support first to the Whig and then to the Republican party. Hale opposed the Missouri Compromise in 1820 and the Kansas-Nebraska Bill in 1854 and was a vigorous advocate of the colonization of Kansas by "Free State" settlers. For many years he was a member of the State Legislature. He was one of the founders of the *North American Review* (1815) and of the *Christian Examiner* (1823).

HALE, Philip (1854–). An American music critic. He was born at Norwich, Vt., and from childhood was remarkable for his musical talent. He graduated at Yale in 1876 and was admitted to the bar at Albany in 1880. After his graduation his musical studies kept pace with his reading in law, Dudley Buck being his teacher. He was in Europe from 1882 to 1887, during which period he studied the organ with Haupt, Faiszt, Rheinberger, and Guilmant; composition with Urban, Bargiel, Rheinberger, and Guilmant; and the pianoforte with Raif and Scholz. Returning to the United States, he held the following appointments: 1879–82, organist of St. Peter's, Albany; 1887–89, at St. John's, Troy; 1889, of First Religious Society of Roxbury, Mass.; and 1887–89, conductor of the Schubert Male Chorus Club. From 1889 to 1903 he was musical critic of the Boston *Journal;* 1897–1901, editor of the *Musical Record;* 1901–03, of the *Musical World.* After 1900 he wrote the analytical notes of the programmes of the Boston Symphony Orchestra and after 1903 was connected with the staff of the Boston *Herald* as editorial writer and musical editor.

HALE, Salma (1787–1866). An American historian and politician, born in Alstead, Cheshire Co., N. H. He learned printing in the office of a paper in Walpole, N. H., and at the age of 18 became editor of the Walpole *Political Observatory.* In 1813 he moved to the neighboring town of Keene, where he studied law, but was not admitted to the bar until 1834. He was elected to Congress as a Republican (Democrat) in 1816, but declined a reëlection. During the following years he held several local political offices and was secretary to the Boundary Commission appointed to determine the northeastern frontier of the United States. He interested himself in the causes of temperance, education, abolition, and Unitarianism, and while in Congress opposed the Missouri Compromise. His works include: *A History of the*

United States for Schools (1821), which won a $400 prize and gold medal offered by the American Academy of Belles Lettres of New York; *The Annals of the Town of Keene* (1826); a number of other books, orations, and articles in newspapers and periodicals, as well as one or two translations.

HALE, SARAH JOSEPHA (BUELL) (1788–1879). An American editor and author, born in Newport, N. H. After the death of her husband, in 1822, she turned to literature and throughout the rest of her life was constantly engaged in writing and editing. She took charge of the Boston *Ladies' Magazine* in 1828 and conducted *Godey's Lady's Book* after its consolidation with the former in 1837. She advocated the social and intellectual advancement of women and is said first to have suggested Thanksgiving Day as a national holiday. She was also active in raising money to complete the Bunker Hill Monument. She published many volumes of poems, some of which had great contemporary popularity, and edited several anthologies. She also published: *Northwood* (1827); *Sketches of American Character* (1830); *Traits of American Life* (1835); *Grosvenor: A Tragedy* (1838); *Alice Ray* (1846), a romance in rhyme; *The Judge: A Drama of American Life* (1854); *Woman's Record, or Sketches of Distinguished Women from the Creation to the Present Day* (1853). She edited *The Letters of Madame de Sévigné* (1856), *The Letters of Lady Mary Wortley Montagu* (1856), and other works.

HALE, WILLIAM BAYARD (1869–). An American journalist, born at Richmond, Ind. Educated at Boston and Harvard universities and at the Episcopal Theological Seminary, Cambridge, Mass., from 1892 to 1899 he was rector at Middleboro, Mass., and then for a year rector at Ardmore, Pa. He was managing editor of the *Cosmopolitan Magazine* (1900), editor of *Current Literature* (1901), special correspondent for the New York *World* (1902), managing editor of the Philadelphia *Public Ledger* (1903–07), editor of the New York *Times* "Saturday Review of Books" (1906–08), Paris correspondent of the New York *Times*, and on the staff of the *World's Work* (1909). His writings include: *The Eternal Teacher* (1895); *The Making of the American Constitution* (1896); *Phillips Brooks, a Memorial; The New Obedience* (1898); *A Week in the White House with Theodore Roosevelt* (1908); *Woodrow Wilson: The Story of his Life* (1912).

HALE, WILLIAM GARDNER (1849–). An eminent American Latinist, born in Savannah, Ga. He graduated from Harvard University in 1870 and studied at the universities of Leipzig and Göttingen (1876–77). He served as tutor in Latin at Harvard from 1874 to 1876 and from 1877 to 1880. In 1880 he was appointed professor of Latin at Cornell University, and in 1892 accepted appointment as head of the Latin department in the University of Chicago. His publications include: "The Cum-Constructions: Their History and Functions," in *Cornell Studies in Classical Philology* (1887–89); "The Sequence of Tenses in Latin," in *American Journal of Philology*, vols. viii–ix (1887–88); *The Anticipatory Subjunctive in Greek and Latin* (1894); *A Latin Grammar* (1903), with C. D. Buck; various papers in classical journals; and several school books in Latin. He took a prominent part in establishing the American School of Classical Studies at Rome and was its first director (1895–96). He received the degree of LL.D. from Union College in 1895, from Princeton University in 1896, from St. Andrews and Aberdeen in 1907. In 1892 he was elected president of the American Philological Association.

HÁLEK, hä'lĕk, VÍTEZSLAV (1835–74). A Bohemian poet, born at Dolinek and educated at Prague. He devoted himself to journalism, but his talent was poetic and more especially lyric, and his collected lyrics, *Vpřírodě* (In Nature, 1872–74) and *Večerní pisně* (Evening Songs, 11th ed., 1891), rank him with Neruda, as among the foremost of the modern Czech poets. He also wrote the epic poems: *Krásná Lejla* (1859); *Alfred* (1858); *Mejrima a Husejn* (1859); *Goar* (1864); *Cerny prápor* (The Black Flag, 1867); *Dědicové Bílé Hory* (The Heirs of the White Mountain, 1869); *Děvče z Tater* (The Tatra Maiden, 1871); *Pohádky z naší vesnice* (Tales from our Village, 1873), in which lyric and epic mingle. His plays, *Carevič Aleksej, Zaviš z Falkenštejna*, and *Král Rudolf*, were fairly successful. A complete edition of his works, including some fiction, was published at Prague (1878–87), with a biography.

HALEN, hä'lĕn, or **HALEM,** hä'lĕm, DON JUAN VAN, COUNT OF PERACAMPOS (1790–1864). A Spanish general and patriot of Belgian descent, born on the Isla de León. He entered the navy when he was 15 and was present at the battle of Trafalgar. He took part in the rising against the French at Madrid (May 2, 1808) and at Ferrol was captured, but joined the French army and became an artillery officer under Joseph Bonaparte (1809). In 1813 he went to Barcelona in Suchet's staff, joined a Spanish patriotic society, and treacherously surrendered Lérida, Monzón, and Mequinenza. Two years afterward he was accused of complicity in a conspiracy against Ferdinand VII and was imprisoned, but almost immediately released and made a lieutenant. Again, in 1817, he was involved in Torrijo's plot, was put in the prison of the Inquisition, but escaped and fled to Russia where he entered the army and served in the Caucasus. In 1821 he returned to Spain and fought under Mina for the Constitutionalist party. He took part in politics and was prominent in the Belgian revolution of 1830, being placed at the head of the insurgent forces, but soon after the expulsion of the Dutch from Brussels he quarreled with De Potter and resigned. Once more in Spain (1834), he was appointed Cordova's adjutant and served with success against the Carlists (1836). In 1840 he was made captain general of Catalonia. In 1842 he put down the uprising in Barcelona, but the opposition to Espartero had grown too strong in 1843, and he escaped to England in July. He returned to Spain in 1850 and in 1854 became president of the Supreme Navy and Army Court. He wrote: *Relación de su cautividad en los calabozos de la Inquisición, su evasión y emigración* (1827); *Memoiren* (1827); *Les quatre journées de Bruxelles* (1831).

HALES, hālz, ALEXANDER OF. See ALEXANDER OF HALES.

HALES, JOHN (1584–1656). A Church of England divine. He was born at Bath, April 19, 1584, educated at Oxford, became fellow of Merton (1605), fellow of Eton (1613), canon of Windsor (1639), but was ejected by the Parliamentary committee from his canonry (1642) and his Eton fellowship (1649). He died at Eton, May 19, 1656. In 1618–19 he was present in the Synod of Dort (q.v.) and has given an interesting account of it. The discussions changed him from Calvinism to Latitudinarianism. His learning, popularity, and practical sense were so admired by his contemporaries that they thought posterity could not possibly forget him, and his first editor issued his works under the caption *Golden Remains of the Ever Memorable Mr. John Hales* (London, 1659); a fuller collection appeared in Glasgow (3 vols., 1765). His most famous single work is his *Tract Concerning Schism and Schismatics*, written in 1636, but not printed till 1642.

HALES, Stephen (1677–1761). An English physiologist and inventor. He was born at Bekesbourne, Kent, and died at Teddington, Middlesex, in 1761. He entered Corpus Christi College, Cambridge, in 1696, was elected fellow in 1702, and, having taken holy orders, was presented about 1710 to the perpetual curacy of Teddington. He was a fellow of the Royal Society and trustee for the Colony of Georgia. He was the author of *Statical Essays*, the first part of which was published under the title of *Vegetable Staticks, or an Account of Some Statical Experiments on the Sap of Vegetables* (1727), and which rapidly acquired so high a reputation as to be translated into French, German, Dutch, and Italian, and may be considered the starting point of our true knowledge of vegetable physiology. A second part of this work, under the title *Hæmostaticks* and treating of the circulation of the blood, appeared in 1733. In addition to valuable researches in botany and physiology, he contributed numerous memoirs to the *Philosophical Transactions* on ventilation, on the method of keeping water fresh, on electricity, on the analysis of the air, etc. Ventilating machines which he invented were introduced into London prisons and were found most efficacious in diminishing mortality among the prisoners. His system was also adopted in France with similar good results. He wrote a number of essays on the evils of the drinking of spirits, which were extremely popular and widely circulated in the cause of temperance. In his experiments with gases he collected them over water—a method which was extensively employed by Priestley and other workers in the field.

HA-LEVI, hä′-lā′vė, Judah. A Jewish poet and scholar of the eleventh and twelfth centuries. See Judah, Ben Samuel.

HALÉVY, ȧ′lā′vė′, Jacques François Fromental (1799–1862). A celebrated French dramatic composer, born in Paris, of Jewish parentage. After a little preparatory study he entered the solfège class of the Paris Conservatory in 1809. The following year he undertook the study of the pianoforte under Charles Lambert and in 1811 of harmony under Berton. Five years in the study of counterpoint under Cherubini followed, after which in 1819 he won the Prix de Rome with a cantata, *Herminie.* His time in Italy was devoted principally to operatic composition, and after considerable difficulty he succeeded in having the result of his labors, the opera *L'Artisan*, presented in Paris in 1827. The public, however, received it coldly and refused the composer any recognition until, in 1834, his successful treatment of Hérold's unfinished opera, *Ludovic*, which he completed, won general commendation from critics and public alike. *La Juive*, produced in 1835, marked his first triumph and was followed six months later by the equally successful *L'Eclair*. *Guido et Ginevra* (1838) met with but an indifferent reception, a fate which pursued *Les treize* (1839) and *Le Drapier* (1840). With *La reine de Chypre* (1841) his first success was repeated. He held many important positions, beginning as a teacher at the conservatory in 1827, and being appointed at the same school professor of theory in 1833 and of composition in 1840. He also served as accompanying pianist at the Théâtre Italien (1827) and as *chef du chant* at the Grand Opéra (1829). Among his pupils were Gounod, Victor Massé, Bizet, Bazin, and Henri Duvernoy. As a composer, he suffered from Meyerbeer's overshadowing popularity, although he is regarded as possessing a far greater depth of sentiment than his more successful confrère. Certain it is that he did not consult the public, and in consequence his music was frequently misunderstood. His masterpiece is undoubtedly *La Juive*, which is deservedly recognized as a classic. He was elected permanent secretary of the Académie des Beaux-Arts in 1854. He died in Nice, but was buried in Paris. For his life, consult Léon Halévy, *F. Halévy, sa vie, ses œuvres* (Paris, 1863), which contains a full account of all his numerous compositions.

HALÉVY, Joseph (1827–). A French Orientalist, born at Adrianople, Turkey. He studied at Jewish colleges in Adrianople and Bucharest and attracted some attention by his Hebrew verse. In 1868 he was commissioned by the Alliance Israélite Universelle to study conditions among the Falashas of Abyssinia and in 1869–70, under the direction of the Académie des Inscriptions, traveled in Yemen, where he obtained copies of 686 inscriptions, chiefly Sabæan and Himyaritic, later published in his *Rapport sur une mission archéologique dans le Yémen* (1872). He was appointed adjunct professor of Ethiopic at the Ecole des Hautes Etudes and assistant librarian of the Asiatic Society. As an Assyriologist, he is known for his contention that the Sumerian people and literature never existed, and that their so-called writing was a cryptography invented by the Babylonian priests to lend greater secrecy to their compositions. Halévy also became prominent as a biblical critic. His publications include further: *Voyage au Nedjrân* (1873); *Etudes sabéennes* (1875); *Etudes berbères, épigraphie lybique* (1875); *La prétendue langue d'Accad, est-elle touranienne?* (1875); *Recherches critiques sur l'origine de la civilisation babylonienne* (1876); *Mélanges de critique et d'histoire relatifs aux peuples sémitiques* (1883); an *Essai sur l'origine des écritures indiennes* (1886); *Précis d'Allographie assyro-babylonienne* (1912). A series of *Recherches bibliques*, published by him in the *Revue des Etudes Juives* from 1886 to 1892, was continued from 1893 in the *Revue Sémitique d'Epigraphie et d'Histoire Ancienne*, which he founded in the beginning of that year, and in which he published during 20 years a very large number of important articles dealing with epigraphy, philology, biblical interpretation, and history. He also wrote much for the *Revue Critique* and the *Journal Asiatique.*

HALÉVY, Léon (1802–83). A French man of letters, born in Paris, brother of Jacques François Halévy the composer. He became a supporter of Saint-Simon and one of the founders of *Le Producteur.* In 1831 he was appointed adjunct professor of literature in the Ecole Polytechnique and from 1837 to 1853 was chief of the bureau of historical monuments in the Ministry of Public Instruction. His works include: *Recueils de fables* (1844 and 1856) and *La Grèce tragique* (1846), both of which were crowned by the French Academy; *Vie de François Halévy* (1862); and several dramatic works, including *Le Czar Démétrius* (1829), *Electre* (1864), and *La mort de Nostradamus* (1875).

HALÉVY, Ludovic (1834–1908). A French dramatist, born in Paris. He achieved great popularity during the Second Empire for work in collaboration with Henri Meilhac (q.v.) in light comedy and by writing Offenbach's most popular librettos. Their first great success was *La belle Hélène* (1865), followed by *Barbe bleue* (1866); *La grande duchesse* (1867); *La Périchole* (1868); *Carmen* (1875); and *Le petit duc* (1878). They wrote also during this period farces of unusual levity and towards the close of the Empire essayed the serious though sensational drama in *Frou-Frou* (1869), one of the greatest theatrical successes of the century. From the literary point of view the best of their joint work is in realistic and farcical satires, such as *Tricoche et Cacolet* (1872), *La boule*, or, in still lighter vein, the sparkling, effervescing one-act play *Réveillon* and the clever but unsavory *Toto chez Tata*. Both Meilhac and Halévy worked also independently. Here Halévy devoted himself almost wholly to novelistic satire and idyllic sketches. Of the former, the best are the three astonishingly clever volumes on the Cardinal family: *M. et Mme. Cardinal* (1873); *Les petites Cardinal* (1880); *La famille Cardinal* (1883), whose head is a "corrupt Puritanic Prudhomme of vice." Of the latter, *L'Abbé Constantin* (1882) is world-renowned for its fresh charm, and the early part of *Criquette* (1883) is hardly less winning in its picture of a theatrical Parisian gamin. In these single-handed works we easily discern the characteristic traits of Halévy's genius—taste, refinement, and pathos. He was elected to the Academy in 1884. The dramatic works (*Théâtre complet*) of Halévy and Meilhac were published in eight volumes (1900–02). Consult Matthews, *French Dramatists of the Nineteenth Century* (3d ed., New York, 1901), and H. d'Alméras, *Avant la gloire; leurs débuts* (Paris, 1903).

HAL'FA. A name for esparto (q.v.), a Spanish grass used in paper making. See Feather Grass.

HALF APE. A book name for a lemur (q.v.).

HALF'BEAK'. One of a group of synentognathous marine fishes, related to the pikes and needlefishes, and constituting the family Hemiramphidæ, which are conspicuously distinguished by the shortness of the upper half of the beak-like jaw, the lower mandible being variously prolonged beyond it. (See Plate of Needlefish, Pikes, etc.) All are small, about a foot in length, handsomely colored, and mostly remain near shore in warm latitudes. They swim near the surface, often in large schools, and feed on algæ; they are excellent to eat. The common Spanish name in the West Indies is balao (dancer), and some species are called pajarito and escribano; while one beautiful and rather peculiar form (*Chriodorus atherinoides*), abundant at Key West, Fla., is called hardhead.

HALF BLOOD. In English and American law, the relationship of persons who have one parent only in common, as half brothers, etc. When two persons have the same father, but not the same mother, they are said to be *consanguineous;* when they have the same mother only, they are called *uterine* brothers or sisters. In the succession to real property in England the half-blood relations of the father's side succeed after the full-blood relations; and next the half-blood relations of the mother's side. This is a modification of the common-law rule, however, as by that law persons of the half blood were excluded entirely from the line of descent and were not capable of inheriting from each other. In Scotland, also, the half-blood consanguineous succeed to heritable estates in the same way, though not in identically the same order; but the half-blood uterine never succeed in any event. In England, as regards personal estate, the half blood on both sides succeed indiscriminately and share equally with the full blood. But in Scotland the half blood succeed to movable property only after all the full blood and their descendants are exhausted, and then the half blood by the father's side succeed in exclusion of the half blood by the mother's side, who do not come in until the succession reaches a distant point, viz., where the nearest relations are uncles and aunts paternal, or their descendants, in which case only the half-blood uterine after the mother's death take half the property, and the paternal relatives the other half.

The common-law disability of the half blood formerly existed in the United States, but has everywhere been wholly or partially removed by statute. In some States the modern English rule has been adopted, brothers or sisters of the half blood succeeding after those of full blood, while in others no distinction whatever is made between them. It is to be observed that the distinction between the whole and half blood exists only in determining the relationship of brothers and sisters to one another and for the purpose of determining the descent of property from one of these to the other, all children being equally related to a common parent. See Consanguinity; Descent.

HALF BREEDS. A political nickname applied, in 1881 and the years immediately following, to members of a faction in the Republican party in the State of New York which favored the administration in the controversy between President Garfield and Senators Platt and Conkling (the Stalwarts, q.v.) and opposed the regular Republican candidate for the governorship of the State, Folger, thus bringing about the election of the Democratic candidate, Grover Cleveland. President Garfield was victorious, Senators Platt and Conkling resigned in order to be reëlected and discredit the President, but were defeated by the Half-Breed candidates, Miller and Lapham. The name was given in derision, as denoting those who were but half Republican. The term was also used to some extent in other States.

HALF MOON, The. The name of the ship in which Henry Hudson, commissioned by the Dutch East India Company, in 1609, undertook his voyage in search of the Northwest Passage, and in which he skirted the New England coast and sailed up the Hudson River.

HALF MOON, The. A former tavern in Aldersgate, London, once the resort of many literary men. Its present designation, Shakespeare's House, is without foundation.

HALF PAY. See Pay and Allowances.

HALF SNIPE. The British jacksnipe (q.v.).

HALF TIMBER. A system of construction in which the interstices of a heavy timber framing of uprights, horizontals, and braces are filled up with masonry of brick or rubble or with lath and plaster. It was much used in Europe in the Middle Ages and is still employed in England to some extent for country houses.

HALF TONE. See PHOTO ENGRAVING.

HALFWAY COVENANT. The designation given to a peculiar modification of church membership which arose in early New England. According to the view prevalent in the Congregational churches of New England at their foundation, the only proper members of a local church were men and women of personal Christian faith and experience and their minor children. The growth to maturity of the children of the first settlers raised the question of the permanent ecclesiastical status of such children. Were they still members, though lacking a personal Christian experience? The question was answered in the affirmative by many early New England ministers, by a ministerial convention which met at the request of Connecticut and summons of Massachusetts in 1657, and by a synod of the Massachusetts churches in 1662. It was held by them that such as were members themselves in infancy by reason of their parents' membership were still sufficiently members when of mature years, even if not of conscious Christian experience, to transmit the same degree of membership in turn to their children and to have their children baptized. To bring their children for baptism they must enter into a "covenant" with the church to submit to its discipline and give an intellectual assent, at least, to the main truths of Christianity. In the absence, however, of a personal Christian experience they were not fit to partake of the Communion. Hence the name "halfway," or halfway into full church membership. The ascription of a political significance to the system (increased access to the franchise) is without foundation. The system was the occasion of long controversy in New England; it was opposed by Jonathan Edwards and his disciples, and died out in the early part of the nineteenth century. Consult: Walker, *Creeds and Platforms of Congregationalism* (New York, 1893); Allen, *Jonathan Edwards* (Boston, 1889); Byington, *The Puritan in England and New England* (ib., 1896).

HAL′HED, NATHANIEL BRASSEY (1751–1830). An English Orientalist, born at Westminster. He studied at Christ Church, Oxford, and afterward went to India, where, at the instance of Warren Hastings, he translated a digest of the Sanskrit law books, under the title *A Code of Gentoo Law, etc.* (1776). This work went through three editions and was translated into French in 1778. After his return to England in 1785 he was elected to Parliament (1790), of which body he continued a member until 1795. He afterward took a prominent part in the defense of the prophetic claims of Richard Brothers, whose teachings, bearing considerable resemblance to Oriental mysticism, had captivated him. His collection of Oriental manuscripts was purchased by the British Museum. His publications include: *A Grammar of the Bengal Language* (1778); *A Narrative of the Events . . . in Bombay and Bengal Relative to the Mahratta Empire* (1779); *Imitations of Some of the Epigrams of Martial* (1793).

HALIBURTON, hăl′ĭ-bûr′t'n, HUGH. See ROBERTSON, JAMES L.

HALIBURTON, THOMAS CHANDLER (1796–1865). A British-American humorist who wrote under the pen name of "Sam Slick." He was born at Windsor, Nova Scotia, and was educated at King's College in his native town. He was called to the bar in 1820, was raised to the bench of the Common Pleas in 1828, and became judge of the Supreme Court in 1842. In 1856 he retired from the bench and took up his residence in England. In 1858 he received the degree of D.C.L. from Oxford and in 1859 entered Parliament as Conservative member for Launceston. Haliburton is best known as the author of *Sam Slick*, the name of a Yankee clock maker and peddler, whose quaint drollery, unsophisticated wit, knowledge of human nature, and aptitude in the use of what he calls "soft sawder," have given him a fair chance of a long literary life. In a subsequent series the author brings Sam Slick to England as an attaché of the United States Legation. These sketches, begun in the *Nova Scotian* newspaper in 1835, appeared in three series (1837, 1838, 1840). Copied into other papers, they were for a long time popular in America and in England and were translated into several continental languages. Among Haliburton's other works are: *An Historical and Statistical Account of Nova Scotia* (1829); *The Letter-Bag of the Great Western* (1839); *Rule and Misrule of the English in America* (1851); *Traits of American Humor* (1852); *Nature and Human Nature* (1855). Consult *Memoir*, by Crofton (Halifax, 1889). See also CANADIAN LITERATURE.

HAL′IBUT (from ME. *haly*, Eng. holy + ME. *butte*, Eng. *but*, Ger. *Butte*, Swed. *butta*, flounder; so called as eaten especially on holy days). The largest and most important of the flatfish. This species (*Hippoglossus hippoglossus*) is elongated and rather thick in form (see Colored Plate with FISH AS FOOD) and lies on its left side, which is white, while the right side, uniform dark brown in color, with very small smooth scales, is uppermost and bears both the large eyes. The capacious mouth is symmetrically placed, as also are the ventral fins. Specimens sometimes reach huge size—7 or 8 feet in length—and weigh 400 pounds or more; but these are believed always to be females, and their flesh is poor. A weight of 75 pounds or less is more usual, and such fish are in better condition. Little ones are called "chicken halibut" by the New England fishermen. The halibut abounds in all northern seas at moderate depths, extending as far south as it can find water only a few degrees above the freezing point; hence it ranges farther in winter than in summer, infrequently to the region of New York on the eastern, and San Francisco on the western, coast; or to the English Channel in Europe. Formerly it was extremely numerous in Massachusetts Bay and on George's Bank, but since about 1850 has become scarce south of the Banks of Newfoundland, where it haunts the skirts of the Banks, and must year by year be followed into deeper and deeper water (300 to 500 fathoms) as those in the shallower places are depleted. The halibut are voracious and, despite their bulk, active and fierce; their principal food is believed to be mollusks and crustaceans of various kinds, but they chase and devour all sorts of fishes and sometimes follow the schools of Arctic capelin close inshore, or pursue fishes at the surface, disabling them with strokes of the tail as well as seizing them in their mouths. The halibut, in its turn, is preyed upon by seals, the white whale, various large sharks, and, when young, by its own kind. The females become heavy with roe in the latter part of summer and then seek comparatively shallow water in which to spawn.

Halibut are caught by the same methods as are cod. (For particulars, see Fisheries.) Two other closely related fishes are the arrow-toothed halibut (*Atheresthes stomias*) of the north Pacific, about 2 feet in length and largely caught and utilized in the Aleutian Islands; and the Greenland halibut (*Reinhardtius hippoglossoides*), which is yellowish brown, may reach a very large size, and inhabits the Arctic Atlantic, but not numerously.

HAL′ICARNAS′SUS (Lat., from Gk. Ἁλικαρνασσός). A Greek city of Caria, in the southwestern part of Asia Minor, on the north shore of the Ceramic Gulf. It was founded by a colony from Trœzen and was one of the cities of the so-called Doric Hexapolis, from which confederacy, however, it was eventually excluded. The Ionian element in the population seems to have been large, for in the fifth century B.C. the official dialect was Ionic. (See Ionia; Greek Language.) Close to Halicarnassus was the Carian city Salmacis, which formed with it one community and later became its chief and almost impregnable citadel. By the Peace of Antalcidas (q.v.) the city came under Persian control. Under the Persian rule it passed to the dominion of the tyrant Lygdamis, whose daughter Artemisia (q.v.), while ruling for her infant son, commanded a squadron in the fleet of Xerxes (480 B.C.). With help from Samos the city threw off the Persian rule and became, with other Carian cities, for a time a member of the Athenian League. Later it again fell under Persian control, and in the fourth century we find it the capital of the rulers of Caria. The most celebrated of these was Mausolus, son of Hecatomnus, in whose honor his sister and wife, Artemisia, erected the great mausoleum (q.v.). Alexander the Great destroyed the lower town, but could not capture Salmacis. From that time the town was comparatively insignificant. Halicarnassus was the birthplace of two of the most eminent of the Greek historians, Herodotus and Dionysius, and of the poet Panyasis. Early in the fifteenth century the Knights of St. John erected here a strong citadel, to which they gave the name of the Petronion, in honor of St. Peter. From this is derived the modern name of the town, Budrun. The ancient walls can still be traced, and the site of several temples, the theatre, etc., has been surely determined. For an account of the discovery of the ancient remains of the city and of the disentombment of the mausoleum, see Mausoleum.

HALICARNASSUS, Dionysius of. See Dionysius of Halicarnassus.

HALIDON (hăl′ĭ-don) **HILL.** A height of land in England, a short distance northwest of Berwick-upon-Tweed, noted as the scene of a bloody conflict between the English and the Scots, July 19, 1333. Edward III, in support of the claims of the fugitive Edward Baliol (q.v.) to the crown of Scotland, had advanced to the borders with a large army and laid siege to Berwick. The Scottish forces under the Regent of Scotland, Archibald Douglas, Lord of Galloway, surnamed "the Tyneman," marched to the relief of Berwick and found the English drawn up on the north side of Halidon Hill. Regardless of fatigue, the Scots immediately advanced to the attack, suffering severely from the English archers while crossing the morass which skirts the base of the hill. They nevertheless struggled onward and succeeded in mounting the hill, but were thrown into confusion by a charge of the English and were totally routed. The English cavalry and the Irish auxiliaries committed great slaughter among the fugitives. According to the Chronicle of Lanercost, Archibald Douglas, "seven earls, 27 bannerets, and 36,320 foot soldiers" fell. The English loss was comparatively small. The town of Berwick immediately surrendered, and Edward Baliol for a short time regained possession of the throne. Consult Lang, *History of Scotland*, vol. i (London, 1900). See Scotland.

HAL′IFAX. A town and county borough in the West Riding of Yorkshire, England, on the Hebble, 7 miles southwest of Bradford (Map: England, E 3). It has exceptional facilities for water and railway transportation, which contribute to the importance of its woolen and cotton industries. It also has iron, machine, and chemical works, and neighboring coal mines and stone quarries. There are numerous charitable institutions and public and private educational establishments, which include the Heath Grammar School, founded in 1585, and the Blue Coat School. The standard of municipal administration is high. The town maintains free libraries, markets, slaughterhouses, a fire-brigade station, and a cemetery; it owns its water, gas, and electric works, tramways, bathing establishments, paving-stone quarry, and has a modern system of refuse and sewage disposal. Halifax sends two members to Parliament. Mentioned in the twelfth century, it was an obscure hamlet until the fifteenth, when the settlement of Flemish artisan refugees inaugurated its growth and prosperity. It was long under manor rule and did not receive its charter of incorporation until 1848. Daniel Defoe wrote part of *Robinson Crusoe* in the old Rose and Crown Inn, which is still standing. Pop., 1901, 105,000; 1911, 101,556.

HAL′IFAX. The capital of Nova Scotia, Canada, on the southeast or outer coast of the peninsula, in lat. 44° 39′ N. and long. 63° 35′ W. (Map: Nova Scotia, F 4). It is built on the east slope of a small peninsula in Halifax harbor. The harbor is one of the finest in the world. It is entered from the south, extends northward about 6 miles, is about 1 mile in width, and terminates in a magnificent sheet of water called Bedford Basin. It is open at all seasons of the year and offers at all times an easy access and safe anchorage to vessels of any magnitude. It has two entrances, made by MacNab's Island, of which only the western is navigable for vessels of large tonnage. Halifax was for many years the chief naval station for British North America, with dockyards, a dry dock, and complementary establishments; but in 1906 the naval establishment and also the military of the Dominion were taken over and conducted by the Canadian government. The port is, however, still visited annually by ships of the British. The head offices of the Halifax and Southwestern Railway are situated here. Halifax is also the eastern terminus of the Canadian Pacific Railway and of the Intercolonial Railway of Canada and several provincial railways. The port has nearly all the foreign trade of the province and much of that of other ports of the Dominion, especially in winter, when the Gulf of St. Lawrence is frozen over and Montreal and

Quebec inaccessible for shipping. At Halifax the Canadian mails to and from Europe are landed and loaded during the winter season. The Atlantic terminal railway piers were for many years on the north water front of the city, but in 1914–15 there were being constructed, under contracts of some millions of dollars, railway extensions, piers, breakwater, and a union passenger depot, with railway yards, which transfer the ocean terminals to the south end of the water front and nearer the entrance to the harbor. The piers are sufficiently long for the largest transatlantic liners. The export trade of Halifax in agricultural produce, lumber, apples, and fish is large; but its share of the trade of the province has been somewhat reduced by the commercial development of Sydney and Glace Bay. The industrial establishments comprise iron foundries, machine shops, a cotton mill, soap, boot, and shoe manufactories, sugar refineries, and breweries. The value of the manufactured output for 1910 was $12,140,409, as compared with $6,927,552 in 1900, an increase of 75.25 per cent. The city is the seat of various foreign consuls, including consul generals of the United States and Cuba. It is an important military post, defended by 11 forts and batteries, one of which, the citadel crowning the hill on which Halifax is built, was formerly one of the strongest fortifications in America. Another fort in the western side of the harbor, between the entrance and the new terminal, was under construction in 1914. Halifax is now garrisoned by Canadian troops. The extensive and handsome barracks overlook the harbor. The city, with its suburbs, extends along the slope of a hill and covers an area 3 miles long by 1 mile wide. The principal edifices are the post office, customhouse, the province parliament building and library, government house, military hospital, admiralty house, lunatic and blind asylums, Victoria General Hospital, courthouse, theatre, city hall, Nova Scotia Technical College, Convent of the Sacred Heart, railway station, Children's Hospital, etc. A group of new buildings for Dalhousie University were constructed in 1914–15.

Halifax is the seat of the Anglican Bishop of Nova Scotia and Prince Edward Island, and of the Roman Catholic Archbishop of the diocese of Halifax, with their cathedrals. It also has numerous churches. Among its educational institutions are Dalhousie College and University, nonsectarian and well equipped with faculties of arts, sciences, law, engineering, and medicine; St. Mary's College (Roman Catholic); 29 public schools, including an academy and two high schools; the Presbyterian woman's college and conservatory of music, convents, and Presbyterian and Catholic theological colleges. The city is lighted by electricity, has street railways, public gardens, attractive parks, a fine water supply, and a modern system of sewerage. It has become a favorite summer resort, owing to the beauty of its surroundings, its sanitary conditions, bathing and fishing, and the bracing climate. The city and county send two representatives to the Dominion House of Commons and three to the Provincial Legislature. The city is governed by a mayor, elected annually, four controllers (of whom the mayor is chairman), elected biennially, and a board of 18 aldermen, elected triennially, six retiring each year. Founded in 1749, and named in honor of the Earl of Halifax, the contemporary President of the British Board of Trade, it supplanted Annapolis in 1750 as the seat of government. During the Revolutionary War it was one of the chief British bases of supply. Pop., 1891, 38,495; 1901, 40,787; 1911, 46,619.

HALIFAX, Charles Montagu, Earl of (1661–1715). An English statesman and financier. He was a grandson of Henry, first Earl of Manchester, and was born at Horton in Northamptonshire, April 16, 1661. He was educated at Westminster School and Trinity College, Cambridge. A laudatory poem on Charles II in 1685 first brought Montagu into public notice. Two years later appeared the parody on Dryden's *Hind and Panther*, entitled *The Town and Country Mouse*, of which he was joint author with Matthew Prior. He disappeared almost entirely from the field of literature after the appearance of his satire, save as the patron of Addison and other men of letters. He was elected to the Convention Parliament in 1689, where he voted for the declaration that James II had abdicated and that the throne was thereby vacant. He retained his seat in William III's first Parliament and was appointed in 1692 Commissioner of the Treasury. On December 15 of the same year he proposed in the House of Commons to raise 1,000,000 pounds sterling by way of loan—a measure which, adopted, made the beginning of the English national debt, but rendered feasible the reduction of taxes in time of war. In the spring of 1694 money was again wanted, and Montagu was ready to supply it. This time he did so by originating a national bank, a scheme for which had been laid before the government by William Paterson three years before. The capital was to be £1,200,000, and the shareholders were to be called the Governor and Company of the Bank of England. The bill for this was ultimately passed; the result was entirely successful, and Montagu became Chancellor of the Exchequer. His next work was the recoinage of 1695, which he carried out successfully, appointing Newton, of whom he was a lifelong friend and patron, warden of the mint, and raising a tax on windows to pay the expense, instead of the obnoxious impost called hearth money. In 1697 he became First Lord of the Treasury, but soon, being unpopular on account of his arrogant manners, he was obliged to bestow upon himself the auditorship of the Exchequer and resign his higher offices. Harley insisted on his withdrawal from the Commons, and he became Baron Halifax. He was impeached in 1701 before the House of Lords for breach of trust while Chancellor of the Exchequer, and again in 1703, but the proceedings fell to the ground. During the whole of Anne's reign Halifax remained out of office, but was active in promoting the union with Scotland and the Hanoverian succession. On the Queen's death he was appointed a member of the temporary council of regency, and on George I's arrival became Earl and First Lord of the Treasury. His rule lasted only nine months, being terminated by his death, on May 19, 1715. For Halifax's literary activity, consult his *Life and Miscellaneous Works* (London, 1715); for his political career, consult: Burnet, *History of his own Time* (ib., 1724–34); Macaulay, *History of England* (New York, 1856–62); Ranke, *History of England* (Oxford, 1875); *Dictionary of National Biography*, vol. xxxviii (London, 1894).

HALIFAX, John of. See Sacrobosco.

HALIFAX, Marquis of. See Savile, George.

HALIMOTE. See Halmote.

HA′LIOT′IDÆ. See Abalone.

HALIR, hä′lêr, Karl (1859–   ). A Bohemian violinist, born at Hohenelbe. He studied at the Prague Conservatory and in 1874–76 with Joachim in Berlin. In 1888 he was appointed leader of the Court Orchestra at Weimar. In 1894 he settled in Berlin, where he became a member of Joachim's quartet and a teacher in the conservatory. Later he founded a quartet of his own, with Exner, Müller, and Dechert, which soon became world-famous. In 1907 he resigned his post as concertmeister in order to devote his entire time to concertizing and teaching. An American tour (1896–97) was extremely successful. Halir is in the front rank of modern European violinists and teachers.

HA′LITE (from Gk. *ἅλς, hals,* salt). A mineral composed of sodium chloride. It crystallizes in the isometric system; the cube, which is the characteristic crystal form, often developing hollow faces. Halite is characterized by a perfect cubic cleavage; it has a vitreous lustre and is colorless when pure; yellow, red, brown, and purple shades are due to impurities. It is found in irregular beds in rocks of various ages, usually associated with calcite and gypsum, together with clay and sandstone; also forming salt springs, and in the water of the oceans and lakes. The principal deposits in Europe are at Wieliczka, Poland, and at Stassfurt, Germany; it is also found at various localities in the Carpathian Mountains, the Austrian and Bavarian Alps, in western Germany, the Vosges, and the Jura Mountains, and in Cheshire, England. In the United States it occurs in the following States, given in the order of their apparent importance: Michigan, New York, Kansas, California, Louisiana, Illinois, Utah, Ohio, West Virginia, Nevada, Pennsylvania, Virginia, Kentucky, Texas, and Wyoming. The rock-salt deposits of Petite Anse, New Iberia, and other localities in Louisiana, are well known. See Salt.

HAL′ITHE′RIUM (Neo-Lat., from Gk. *ἅλς, hals,* sea + *θηρίον, thērion,* dim. of *θήρ, thēr,* beast). A fossil dugong, of which remains are found in rocks of Miocene age in Europe. See Sirenia; Dugong; Manatee.

HALL, häl. A town in the Austrian Crownland of Tirol, situated on the Inn, which is here navigable, 6 miles east of Innsbruck. (Map: Austria-Hungary, B 3). The parish church, built in 1271, the fifteenth-century Rathaus, the Franciscan convent, and the Münzthurm are the chief buildings. About 9 miles north of the town is the Salzberg, with salt mines, from which salt in the form of brine is conveyed in wooden pipes to the pans of Hall. Hall also manufactures chemicals, felt hats, twine, flour, buttons, paper, cloth, and chicory. Pop. (town), 1890, 5800; 1900, 6200; (district), 1910, 21,770. Hall was a flourishing town in the Middle Ages, but has declined greatly on account of wars and earthquakes.

HALL, or **SCHWÄBISCH** (shvā′bĭsh) **HALL.** An old town of the Kingdom of Württemberg, Germany, situated on the Kocher, 48 miles northeast of Stuttgart (Map: Germany, C 4). It is poorly built, but has some interesting ancient buildings. The church of St. Michael, constructed in 1427–1525, contains a fine altarpiece. The church of St. Catharine, on the left bank of the Kocher, dates from the fourteenth century. Hall has salt works and saline baths and carries on a trade in grain and cattle. The manufactures include iron articles, machinery, cotton yarn, leather, etc. Hall, mentioned as early as 887, owed its importance in ancient times to its saline springs. It was raised to the rank of an Imperial town in 1276, and it was in its mint that the first coins known as *Hellers* were struck. It came into the possession of Württemberg in 1802. Pop., 1900, 9225; 1905, 9401.

HALL (AS. *heall, heal,* Icel. *höllr,* OHG. *halla,* Ger. *Halle;* probably connected with AS. *helan,* obsolete Eng. *heal,* OHG. *helan,* Ger. *hehlen,* Lat. *celare,* Gk. *καλύπτειν, kalyptein,* to hide, OIr. *celim,* I hide). A name given to a large inclosed space in the form of a single apartment, whether a separate structure or part of a larger building. The term is even used, by extension, of the feudal mansions or manor houses of which such a large room was the main part. Finally, in modern architecture, it has come to be applied to the central space which contains the staircase and gives access to other rooms, since in large houses this is often so spacious as to serve the social purposes of a hall.

In the history of architecture the term "hall" is applied to such interiors as the hypostyle hall of an Egyptian temple, the *apadāna of a* Persian palace, or the *tepidarium* of the Roman thermæ, and we call mediæval churches with nave and aisles of equal height, hall churches. But the origin of the term is both secular and northern. The earliest Saxon palaces of the kings seem to have consisted of one large hall, in which the King, his courtiers, and all his retainers dwelt together, and one other chamber, in which the King and his hearthmen slept, while his retainers slept in the hall. The same custom prevailed among other early Norse and Germanic tribes. The Normans built their houses on the same plan, with the hall and one solar (q.v.) or sleeping apartment. The same arrangement prevailed during the twelfth and thirteenth centuries, with certain modifications, especially in the direction of multiplying the private rooms. Then and later the hall, while part of the group of manor buildings, was often a separate structure, with its independent roof, as at Stokesay and Oakham castles. In the fourteenth and fifteenth centuries, when the country was more settled and prosperous and manners had become more refined, more numerous rooms were necessary. The hall, however, still retained its place as the chief apartment. In it the King or the lord of the manor entertained his retainers and guests and performed all the acts of feudal life. At one end of the hall was a raised platform, or dais, on which the table of the lord of the manor was placed, and where his more honored guests sat. The retainers sat at a table in the lower part of the room. The halls were more frequently roofed with wood than vaulted, and these roofs were very carefully and elegantly constructed, as many still remaining show. The hall of the King's palace, now called Westminster Hall, built by William Rufus and restored by Richard II, is the finest example in England, being 300 feet long and 100 feet broad. Those in the Imperial and royal palaces of Germany, as at Goslar, are the earliest and best preserved of their class. In England, from the time of Henry VIII and on, with the increase of privacy in domestic life, the family end of the hall was screened from the more public portion by elaborately carved and paneled screens, many of which still remain. The great "commons," or dining halls, of the English colleges (e.g., Trinity at Cambridge) and lawyers' "inns" (e.g., Middle Temple Hall, London), rival the great civic halls in the beauty of their timber ceilings, screens, and woodwork.

The use of such halls spread from feudal society to other branches of life, especially corporate life in the Gothic and Renaissance periods. There are three principal classes of such halls—the communal halls, the guild halls, and the college halls. The political organization of the free mediæval cities required large meeting places for their governing bodies; they sometimes occupied the entire ground floor, as at Udine, either open or inclosed; sometimes the second floor above a basement, as at Padua (the largest in existence). The entire structure was often most imposing, as at Siena, Perugia, Gubbio, Florence, Cremona. (See PALACE.) They fell into disuse with the fall of liberty in the Renaissance. The second class, the guild halls, without being generally as imposing in Italy (except those of the "schools" at Venice), attained great importance in Flanders and northern France. Here the "Halles" were the heirs of the great Roman markets. Each great corporation possessed one, and where the city was governed by them the communal belfry often rose from its summit, as in the halls of Ypres, Bruges, and Arras. Many of these great structures remain: the Butchers' Hall (Halle à la Viande) at Ghent, Ypres, and Antwerp; the Bakers' Hall (Halle au Pain) at Brussels; the Fishmongers' Hall (Halle aux Poissons) in many towns; the Cloth Hall (Halle aux Draps) at Ghent, Bruges, Louvain, and Brussels; the Bankers' Hall (Bourse) at Antwerp. The finest of all is the Cloth Hall at Ypres, built between 1201 and 1304. Some are open, on piers, especially in the south of France, as at Fijeac and Cordes; others, in France also, are built entirely of wood, as at Villeneuve and Evron. Sometimes they are built around a court, as at Antwerp; but the usual type is an oblong stone structure with wooden timbered roof or vault, in one, two, or three aisles, often with a second-story gallery. The various colleges at Oxford and Cambridge and other universities had common halls, which were often of great architectural dignity and beauty, several of which remain almost unchanged. The history of the term, therefore, shows that it applies to a large meeting place, whether of a feudal family, a corporation, or an entire community.

In more recent times it has been logically applied to large places where any audience is gathered together, especially for musical and other entertainments, such as St. George's Hall in Liverpool or Carnegie Hall in New York. Some of the meeting places notable in our own history bear this name, such as Faneuil Hall in Boston and Nassau Hall in Princeton. The large buildings at American universities, whether dormitories or recitation buildings, even when they contain no large main apartment, are generally called halls. See GALLERY.

HALL, or HOSTEL. An institution in English universities fast dying out, chiefly by absorption into colleges. It was the earliest, and for a long time the only, organization for the support of students outside the foundations of the religious orders. For the establishment of a hall a few students by mutual agreement rented a house, chose a principal, at first generally one of their number, later a master, and applied to the university for recognition. The halls were held on lease, the rent being fixed at intervals, generally, of five years by four taxers, two masters and two citizens, and houses once occupied by students could not be let to a layman so long as a clerk would take it. The halls were under the supervision of the university, which had the right of visitation and gradually acquired considerable authority over them. For centuries the halls greatly outnumbered the colleges, and even after the rise of colleges many halls remained as independent establishments, largely as the residences of wealthier students. Some received endowments and became not unlike small colleges; but most kept to the original idea of a hall, that of an independent self-governing community of students living at their own expense. The rise of colleges where support was given students was the deathblow to the hall idea, and many colleges owed their origin to the absorption of older halls. This process of absorption is still going on, and the halls are now almost extinct, even those now remaining being destined to union with neighboring colleges after a longer or shorter period. See ST. EDMUND HALL.

HALL, ANNA MARIA (*née* Fielding) (1800–81). An Irish novelist, born in Dublin. Her mother, left a widow, took her to London, where she was educated. In 1824 she married Samuel Carter Hall, editor and author. She is most favorably known by *Sketches of Irish Character* (1829); *Lights and Shadows of Irish Character* (1838); *Ireland* (1841–43), a book descriptive of Irish scenery; and *The Whiteboy* (1845). She was a prolific writer of books now mostly forgotten, which appeared during the half century of her literary life, and numbered some 50 titles. It is her Irish stories and novels, named above, that have most vitality. She succeeded in gaining popular favor by several plays. *The French Refugee* (1836), e.g., ran 90 nights at St. James's Theatre. She was an active and practical philanthropist. Unhappily a relentless and ever-present determination to edify her readers limited her audience and is likely in the future to limit it still more narrowly. Consult Hall, *Retrospect of a Long Life* (London, 1883).

HALL, ARTHUR CRAWSHAY ALLISTON (1847–). An American Protestant Episcopal bishop, born at Binfield in Berkshire, England. He was educated at Christ Church College, Oxford, and entered the Cowley Fathers, or Society of Mission Priests of St. John the Evangelist, a community bound to poverty, chastity, and obedience. In 1874 he became assistant pastor of the church of the Advent in Boston, and in 1882 minister to the mission church of St. John the Evangelist in the same city. He was recalled to England in 1891, was elected Bishop of Vermont in 1893, and was consecrated in February, 1894, after being released from the Cowley Order. He wrote: *Confession and the Lambeth Conference* (1879); *Meditations on the Creed* (1880); *Meditations on the Collects* (1887); *The Example of the Passion* (1882); *The Virgin Mother; Christ's Temptation and Ours; A Charge on Marriage and Divorce; Confirmation; Marriage with Relatives* (1901); *Use of Holy Scripture in Public Worship* (1903); *Relations of Faith and Life* (1905).

HALL, ASAPH (1829–1907). An American astronomer, born of Revolutionary stock in

Goshen, Conn. At 16 he became a carpenter, but in 1854 went to Central College, McGrawville, N. Y., and, in spite of indifferent teaching, learned some mathematics in the year and a half he spent there. He studied under Brünnow at Ann Arbor, where he made his first acquaintance with astronomy, and in 1857 went to Cambridge as assistant to Professor Bond at the pitiful salary of three dollars a week. He studied mathematics and German by himself and gradually advanced until he earned $600 a year at the Cambridge Observatory. In 1862 he took a civil-service examination and became an aid, and a year afterward professor of mathematics, in the United States Naval Observatory. This position he held until 1891 and was sent on several expeditions—in 1869 to Bering Strait, in 1870 to Sicily to observe eclipses, in 1874 to Vladivostok to observe the transit of Venus, to Texas in 1882 for the same purpose, and to Colorado in 1878 on a solar-eclipse expedition. His greatest fame came from his discovery in 1877 of the two satellites of Mars, which he called Deimos and Phobos. In recognition of this discovery he received a gold medal from the Royal Astronomical Society and the award of the Lalande prize from the Paris Academy. In 1875 he was elected a member of the National Academy of Sciences and afterward was elected its president. He retired from the government employ in 1891 and four years later went to Harvard as professor of astronomy, where he remained until 1901. In the latter year he was president of the American Association for the Advancement of Science.

HALL, Basil (1788–1844). A British naval officer, author, and traveler, born and educated in Edinburgh. He entered the navy in 1802, saw service on the coasts of China, India, and South America, was made post captain in 1817, and left the navy in 1823. The rest of his life was spent in travel, and scientific pursuits at home. The descriptions of his various voyages while in the navy, and of his subsequent travels, show a broad and keen observation and were well received, though his *Travels in North America* caused great indignation and met with much hostile criticism in the United States, because of his outspoken remarks upon American customs. His scientific work was mostly confined to personal experimentation and was of little permanent value. In 1842 his mental powers failed, and he died in confinement two years later. His most important writings are: *A Voyage to the West Coast of Corea and the Great Loo-Choo Island* (1818); *Extracts from a Journal Written on the Coasts of Chili, Peru, and Mexico* (1824); *Travels in North America* (1829); *Fragments of Voyages and Travels* (1831–33).

HALL, Carl Christian (1812–88). A Danish statesman, born at Christianshavn. He became a lecturer on law in 1847 and professor in 1851 at the University of Copenhagen. In 1848 he was a member of the last Diet of the states, and thereafter was a member of the Folkething (national parliament) until 1881. His efforts united the great middle class in the "June Union," the forerunner of the Danish Liberal party. He advocated complete union with Schleswig. In 1854 he became Minister of Public Worship, and from 1857 to 1863, except for a short interval in 1859–60, he was President of the Council. As Premier and Minister of Foreign Affairs after 1858, he endeavored to solve the Schleswig-Holstein problem by diplomacy. He resigned when Christian IX came to the throne, but in 1870–73 was again Minister of Public Worship in the Holstein-Holsteinborg cabinet. Apoplexy necessitated his retirement in 1881.

HALL, Charles Cuthbert (1852–1908). An American Presbyterian clergyman and theologian, born in New York City. He was educated at Williams College, Union Theological Seminary, the Presbyterian College in London, and the Edinburgh Free Church College; was ordained in 1875, and succeeded Wendell Prime as pastor of the Union Presbyterian Church of Newburgh, N. Y. Two years afterward he became pastor of the First Presbyterian Church of Brooklyn, N. Y. *Qualifications for Ministerial Power* (1894) was the subject of Dr. Hall's Carew lectures at Hartford Theological Seminary. Long a director of Union Theological Seminary, he was chosen president of this institution in 1897. In 1902–03, and 1906–07, he lectured in India and the Far East, on the Barrows foundation of the University of Chicago. The results of his studies at this time appeared in: *Universal Elements of the Christian Religion* (1905); *Christian Belief Interpreted by Christian Experience* (1905); *Christ and the Human Race* (1906); *The Witness of the Oriental Consciousness to Jesus Christ* (1907); *Christ and the Eastern Soul* (1909).

HALL, Charles Francis (1821–71). An American Arctic explorer. He was born at Rochester, N. H., and was for a time a blacksmith, a stationer, and a journalist. In 1860 he sailed in the *George Henry* to discover the remains of the Franklin party, the expense of the expedition being borne largely by Henry Grinnell (q.v.). For two years Hall lived among the Eskimos near Frobisher Bay, returning in 1862. In 1864 he published *Arctic Researches* and *Life among the Esquimaux*. In the same year he returned to the Arctic to renew his search for evidences of the fate of the Franklin expedition. It was not till the spring of 1866 that he met Eskimos at Cape Weyton, south of Boothia Felix, who had visited the deserted ships. He obtained from them silver bearing the crest of Franklin and other officers of the party. While searching for further evidence he did interesting geographical work by filling in the gap between Rae's farthest (1846) and Parry's farthest, in Fury Strait (1825), thus completing the mapping of the north coast of the continent. At last, after five years of toil, he met natives near the south shore of King William Land, in the summer of 1869, who gave him personal or traditional information of the fate of 79 men who died of starvation in King William Land. It is probable that the remaining 26 reached the coast of the mainland and perished. McClintock, Hall, Schwatka, and Gilder solved the fate of the Franklin party.

Hall's last expedition was in 1871, under the United States government, in the small naval vessel *Polaris*. He ascended the Smith Sound channels into the Polar Sea to 82° 11′ N., the most northern point attained up to that time by a vessel. Unable to proceed farther, the expedition spent the winter of 1871–72 at Thank God Harbor, on the Greenland coast. In the fall Hall made a sledge journey north to Cape Brevoort and was the first to see the land on the west side of Robeson Channel and to determine approximately its extension to Cape Joseph

Henry 82° 48′ N. Upon returning from this journey he was taken violently ill and died on Nov. 8, 1871. In returning homeward in the autumn of 1872, the *Polaris* was beset in the ice pack and during two months drifted helplessly southward. On October 15 a violent gale, disrupting the pack, threatened the destruction of the ship. While stores were being removed to the ice, the ship was suddenly driven from her moorings into open water. The ice-floe party of 19 drifted 1500 miles in 189 days and was picked up by the sealer *Tigress* off the coast of Labrador. They owed their safety to the heroic leadership of Capt. G. E. Tyson. The *Polaris* was beached in a sinking condition at Life Boat Cove, near Littleton Island, where the crew built a house and passed the winter. In the spring of 1873 the *Polaris* party retreated south in boats and were rescued at Cape York on June 22 by the Scottish whaler *Ravenscraig*. Though the expedition was unfortunate, its geographical results were very important. Hall completed the exploration of Kennedy Channel, discovered Hall Basin and Robeson Channel, extended both Greenland and Grinnell Land northward two degrees of latitude, and visited the unknown Polar Sea. He was not a scientist, but an Arctic pioneer, full of resources, and undaunted by obstacles, many of which he overcame by patient and untiring effort. The scientific results of the *Polaris* expedition were important. Consult: Davis's *Polaris North Pole Expedition* (Washington, 1876); Tyson's *Drift* (New York, 1874); Bessels's *Die amerikanische Nordpolexpedition* (Leipzig, 1879).

HALL, Charles Martin (1863–1914). An American inventor, born in Geauga Co., Ohio. In 1885 he graduated from Oberlin College (A.M., 1893; LL.D., 1910). In February, 1886, he invented an electrolytic process for the reduction of aluminium (or aluminum), and in 1888 commenced the commercial manufacture of the metal with the Pittsburgh Reduction Company (now the Aluminum Company of America), of which he became vice president in 1890. The priority of his invention was upheld and his patent was sustained in the courts of the United States in 1893, and until 1912 his company had a monopoly on the production of the metal in this country. The new process changed aluminium from a metal as costly as silver to a common article of commerce, used largely for cooking utensils. Hall was awarded the Perkin medal for work in chemistry in 1911. See Aluminium.

HALL, Chester Moor (1703–71). An English scientist, inventor of the achromatic telescope. He was born at Leigh in Essex, was a student of the Inner Temple in 1724 and a bencher in 1763. He lived at New Hall, Sutton, and was often called "Moor of Moor Hall." From study of the structure of the human eye he arrived at the conclusion that achromatic lenses were possible; discovered two kinds of glass in 1729, of enough variation of dispersion; and in 1733 had made several telescopes. Though there seems no doubt of the priority of his invention, he took no pains to appear in the suit of Dollond *v.* Champness (1766). See Achromatism.

HALL, Christopher Newman (1816–1902). An English Congregational minister, born at Maidstone, Kent, and educated at Totteridge, at Highbury College, and at the University of London. For 12 years he was pastor of the Albion Congregational Church at Hull. In 1854 he succeeded Rowland Hill and James Sherman at Surrey Chapel, and in 1876 he went to Christ Church, Lambeth, a charge which he resigned in 1892. He became widely known in England as a total-abstinence agitator and as an evangelist. He was a friend of the North during the Civil War and in 1867 toured America with the intention of quieting differences between Great Britain and the United States. Dr. Hall's tracts were his best-known works, especially: *Come to Jesus* (1846); *It Is I* (1848); *Follow Jesus;* and many others, of which hundreds of thousands have been distributed. He wrote besides: *The Land of the Forum and the Vatican* (2d ed., 1859); a biography of his father, under the title *Conflict and Victory* (2d ed., 1874); *Lyrics of a Long Life;* and an *Autobiography* (1898).

HALL, Edward (c.1499–1547). An English historian, son of John and Catharine Hall, who seem to have been prominent in the Reformation and may have been the "John Hall and his wife," prisoners in Newgate, "for the testimony of the Gospel" (1555), mentioned by John Fox. Edward Hall was educated at Eton and at King's College, Cambridge, and studied law. He was a strong defender of the Tudors and carried his ideas of reform no further than the King, but supported the royal supremacy in Parliament, spoke in behalf of the Bill of Six Articles (1539), and was appointed (1541) a member of the commission to deal with all transgressors of that law. His *Union of the Noble and Illustre Famelies of Lancastre and York* (1542; and, the most complete edition, from the press of Richard Grafton, and with a preface by him, 1550) is especially valuable for the reign of Henry VII and the early years of Henry VIII. It was largely used by Shakespeare in his historical plays and was borrowed from by Grafton, Holinshed, and Stow.

HALL, Edwin Herbert (1855–). An American physicist, born at Gorham, Me. He graduated from Bowdoin College in 1875 and from Johns Hopkins University (Ph.D.) in 1880. After 1881 he taught physics at Harvard, where he became professor in 1895. He became a fellow of the American Academy of Arts and Sciences and a corresponding member of the British Association for the Advancement of Science. His publications include: *A Text-Book of Physics* (1891; 3d ed., 1903), with J. Y. Bergen; *Elementary Lessons in Physics* (1894; 1900); *The Teaching of Chemistry and Physics* (1902), with Alexander Smith; *College Laboratory Manual of Physics* (1904; rev. ed., 1913); *Elements of Physics* (1912); and various contributions to scientific journals on the thermal conductivity of iron and nickel, the theory of thermoelectric action, and on thermoelectric heterogeneity in metals.

HALL, Fitzedward (1825–1901). An American philologist, who was born at Troy, N. Y., but spent his mature years in England. He was educated at Walpole, N. H., Poughkeepsie, the Rensselaer Polytechnic Institute, and at Harvard, where he did not finish his course, as he was sent to India to look for a runaway brother. At Benares, in 1850, he was appointed to a post in the Government College, which became in 1853 an Anglo-Sanskrit professorship. In 1855 he was appointed inspector of public instruction for Ajmere and Mairwara and a year later for the Central Provinces. In 1860 he received the degree of D.C.L. at Oxford, and two years later left India for London, where he became professor of Sanskrit, Hindustani, and Indian jurisprudence at King's College, received the post of librarian at the India Office, and in 1864 was made examiner in Hindustani and Hindi on the Civil-Service Commission. In 1880 he succeeded Max Müller as examiner in Sanskrit and from 1887 to his death was examiner in English also. His edition of the *Viṣṇupurāṇa*, containing Wilson's translation (5 vols., 1864–77), is marked by wide reading and by many quotations from unpublished manuscripts in his own possession. About 1870 he turned his attention to English philology, and published: *Recent Exemplifications of False Philology* (1872), an attack on Richard Grant White; *Modern English* (1873); "On English Adjectives in -able, with Special Reference to 'Reliable,'" in *American Journal of Philology* (1877); *Doctor Indoctus* (1880); and other volumes. The most lasting monument to his activity in English philology is his work on the *Oxford Dictionary* and on Wright's *English Dialect Dictionary*. A valuable library of a thousand Oriental manuscripts and many books he gave to Harvard University. From 1869 until his death he lived at Marlesford in Suffolk. His principal works in Sanskrit are: *Atmabodha* (1852); *Sānkhyaprāvachana* (1856); *Sūryasiddhānta* (1859); *Vāsavadattā* (1859); *Sānkhyasâra* (1862); *Daśarūpa* (1865); and in Hindi, a *Reader* (1870) and Ballantyne's *Hindî Grammar* (1868).

HALL, Francis Joseph (1857–). An American Protestant Episcopal theologian, born at Ashtabula, Ohio. He graduated from Racine College in 1882 and studied at the General and the Western theological seminaries. Ordained in 1886, he was professor of dogmatic theology from then until 1913 at the Western Seminary and thereafter held the same chair at the General Seminary. He was also registrar of the diocese of Chicago from 1894 to 1913 and was church counsel in the trial of Dr. Crapsey in 1906. He is author of *Theological Outlines* (3 vols., 1892–95); *Historical Position of the Episcopal Church* (1896); *The Kenotic Theory* (1898); *Introduction to Dogmatic Theology* (1907); *Authority, Ecclesiastical and Biblical* (1908); *The Being and Attributes of God* (1909); *Evolution and the Fall* (1909); *The Trinity* (1910); *Creation and Man* (1912).

HALL, Gertrude (1863–1915). An American author, born in Boston. She was educated in Florence. Her work in verse includes: *Verses* (1890); *Allegretto* (1894); *The Age of Fairy Gold* (1899); *April's Sowing* (1900). In prose she wrote: *The Wagnerian Romances* (1910); *The Unknown Quantity* (1910); *The Truth about Camilla* (1913); and she translated Rostand's *Cyrano de Bergerac* and *Chantecler* and poems of Verlaine.

HALL, Granville Stanley (1846–). An American educator. He was born at Ashfield, Mass., graduated at Williams College in 1867, and subsequently spent several years studying philosophy and psychology in Germany. He was professor of psychology at Antioch College, Ohio, from 1872 to 1876, and at various periods was lecturer on the same subject at Harvard and at Williams. He took his Ph.D. at Harvard in 1878. In 1881 he became professor of psychology at Johns Hopkins University, and in 1888 he was chosen president of Clark University, Worcester, Mass., where he served also as professor of psychology. He received the degree of LL.D. from Michigan, Williams, and Johns Hopkins, and in 1892 was president of the American Psychological Association. An important contributor to educational literature, and a leading authority in that field, he founded, and became editor of, the *American Journal of Psychology* and edited also the *Pedagogical Seminary* (after 1892), the *American Journal of Religious Psychology and Education* (after 1904), and the *Journal of Race Development* (after 1910). Among his books are: *Aspects of German Culture* (1881); *Hints toward a Select and Descriptive Bibliography of Education* (1886), with John M. Mansfield; *The Contents of Children's Minds on Entering School* (1894); *Adolescence* (2 vols., 1904); *Youth: Its Education and Regimen* (1906); *Educational Problems* (2 vols., 1911). Consult G. E. Partridge, *Genetic Philosophy of Education: An Epitome of the Published Writings of G. Stanley Hall* (New York, 1912).

HALL, Isaac Hollister (1837–96). An American Orientalist, born at Norwalk, Conn. He graduated from Hamilton College in 1859 and from Columbia Law School in 1865. After 11 years at the New York bar he was appointed professor at the Protestant College of Beirut, where in 1876 he discovered a Syriac manuscript of the Philoxenian version of the Gospels, Acts, and, in part, the Epistles. This he published in 1884. He returned to America in 1877; distinguished himself by his studies of epigraphy, especially as the first to decipher the Cypriote inscriptions; in 1885 was appointed curator of the Metropolitan Museum of New York City, and in 1886 lectured on New Testament Greek at Johns Hopkins University. In 1887 he was elected president of the American Philological Association. In 1884 he deciphered "Antilegomena Epistles" from the Syriac manuscript discovered by the Rev. W. F. Williams, which he published (1886) in facsimile. He also compiled a *Critical Bibliography of the Greek New Testament as Published in America* (1884).

HALL, Sir James (1761–1832). A British geologist and chemist, noted for his application of chemical tests to geological hypotheses. He was born in Haddingtonshire, Scotland, the eldest son of Sir John Hall, Baronet, and succeeded to the baronetcy in 1776. Having become interested in geology during the early part of his career, he associated intimately with James Hutton, then the most eminent name in that science, and was ultimately led to accept his uniformitarian theory of geology, which explains the phenomena of the earth's crust by steady and progressive natural changes. In testing the theory he traveled extensively, and studied the rocks in different parts of Scotland as well as in the Alps, in Italy, and in Sicily. He also had recourse, for the same purpose, to experiments in his laboratory, but owing to Hutton's disapproval of that method, did not publish the results until after the latter's death in 1797. These made good his contention in some respects against the opponents of Hutton's system. On some points, however, he differed from his master, explaining, e.g., the bowlders on the Jura and similar phenomena at Corstorphine by the supposed action of a sea flood instead of by the glacial theory which is now generally accepted. He was also deeply interested in the study of architecture and in 1813 published an *Essay on the Origin, History, and*

Principles of Gothic Architecture, whose ideas had already been presented in less elaborate form before the Royal Society of Edinburgh in 1797. He aims to prove that Gothic architecture is an evolution begun by reproducing in stone crude wattle buildings, and he constructed a miniature wattle-work cathedral in Gothic style to illustrate his argument. Hall took part in parliamentary life, representing the borough of Michael in Cornwall from 1807 to 1812. After his death, which occurred at Edinburgh in 1832, an account of a machine which he invented for the regulation of high temperatures was given before the Geological Society of London.

HALL, James (1793–1868). An American journalist and author, born in Philadelphia. He studied law, but joined the army in 1812 and served at Lundy's Lane and Fort Erie, and went with Decatur to Algiers in 1815. Meanwhile he continued his legal studies and in 1820 he removed to Shawneetown, Ill., where he began practice at the bar and edited the *Illinois Gazette.* Later he was judge of the Circuit Court and then State treasurer, meanwhile editing at Vandalia, Ill., the *Illinois Intelligencer.* At Cincinnati he conducted the *Western Monthly Magazine* (1833–37) and was engaged in banking. Among his publications are: *Letters from the West* (1829); *Legends of the West* (1832); *Tales of the Border* (1835); *Life of W. H. Harrison* (1836); *History of the Indian Tribes* (3 vols., 1838–44), in collaboration with T. L. McKenney; *The Romance of Western History* (1847). His collected works were published in four volumes in 1853–56.

HALL, James (1811–98). An American geologist and paleontologist, born in Hingham, Mass. In 1832 he graduated from the Rensselaer Polytechnic Institute, where he was assistant professor of chemistry and natural sciences (1832–54) and professor of geology (1854–76), retiring in 1876. In 1836 he was appointed to the Geological Survey of New York and was soon placed in charge of the work in the western part of the State. The report of the survey which appeared in 1843 laid the foundation for the proper classification of the Paleozoic formations in America and was the means of establishing the office of State geologist, with Hall as its occupant. He now devoted himself to a comprehensive study of the older fossil-bearing rocks and published his researches from time to time in various reports and monographs, which have come to be regarded as classics by students in this branch of geology. He was president of the American Association for the Advancement of Science in 1856, of the Geological Society of America in 1889, and was elected honorary president of the International Congress of Geologists at Washington in 1891. He received many honors from foreign scientific societies, including the Wollaston medal of the London Geological Society. Among his more important contributions to geology are the following: *Geology of New York*, part iv (1843); *Palæontology of New York* (8 vols., 1847–94); *Graptolites of the Quebec Group* (1865); and portions of the *Report of the Geological Survey of Iowa* (1858–59) and of the *Report on the Geological Survey of the State of Wisconsin* (1862).

HALL, John (1829–98). An American clergyman, born of Scottish parentage at Market Hill, County Armagh, Ireland, and educated at Belfast College. He was licensed to preach by the Belfast Presbytery in 1849, was a missionary in West Ireland for three years, held a pastorate for an equal period at the First Presbyterian Church in Armagh, and in 1858 accepted a call to St. Mary's Abbey, Dublin, where he remained for nine years, actively occupied in church work and in matters relating to popular education. In 1867 he came to America as a delegate from the General Assembly of the Presbyterian Church in Ireland, and shortly after his return was called to the pastorate of the Fifth Avenue Presbyterian Church in New York City, where he remained until his death. He was a member of the International Sunday-School Committee from 1872 to 1896, served as a trustee of Princeton University and a director of Union Theological Seminary, was Lyman Beecher lecturer on preaching at Yale, and from 1882 to 1891 was chancellor of the University of the City of New York (now New York University). Among his best-known writings are: *Family Prayers for Four Weeks* (1868); *Care Cast upon the Lord* (1869); *Papers for Home Reading* (1871); *Questions of the Day* (1873); *Preaching: Manner and Matter* (1874); *God's Word through Preaching* (1875); *You and Your Children* (1877); *Foundation Stones for Young Builders* (1881); *A Christian Home and How to Maintain It* (1883); *Light unto my Path* (1895). Consult T. C. Hall, *John Hall, Pastor and Preacher* (New York, 1901).

HALL, Sir John (1824–1907). A New Zealand public official, born near Hull, England. He emigrated to New Zealand in 1852 and became a sheep raiser in Canterbury. He held various minor offices, became a member of the House of Representatives for Christchurch in 1855, and in 1856 was Colonial Secretary. He then served as a member of the Legislative Council from 1862 to 1866, when he was again elected to the House. He was Postmaster-General in 1866–69, Colonial Secretary in 1872–73, a member of the Executive Council in 1876, and for a third time a member of the House in 1879. From 1879 to 1882 he was Premier of New Zealand. During his premiership the triennial parliament bill and the universal suffrage bill were passed. In 1891 he was New Zealand delegate to the Australasian Federation Conference.

HALL, John Vine (1774–1860). An English religious writer and advocate of total abstinence. He was born at Diss, Norfolk. When a young man, he fell into drunken habits, but after a hard struggle reformed and became a teetotaler. From 1814 to 1850 he was a bookseller at Maidstone. From 1854 till his death (1860) he devoted himself to religious and temperance work. His *Sinner's Friend* (1821) is said to have been translated into 30 languages and circulated in millions of copies. Consult his autobiography, *Conflict and Victory*, edited by his son the Rev. Newman Hall (London, 1874).

HALL, Joseph (1574–1656). An English bishop, remarkable for his learning, piety, and misfortunes. He was born July 1, 1574, at Ashby-de-la-Zouch, Leicestershire. He was educated at Emmanuel College, Cambridge, of which he became a fellow (1595). Entering the Church, he became, in 1617, dean of Worcester, was one of the English deputies to the Synod of Dort (1618–19), was consecrated Bishop of Exeter in 1627, and in 1641 was translated to Norwich. In the latter years of his life he was accused of

Puritanism and incurred the displeasure of Archbishop Laud. In 1641, having joined the prelates who protested against the validity of all laws passed during their forced absence from Parliament, he was committed to the Tower and threatened with prosecution for high treason; but was set at liberty at the end of seven months, on finding bail for £5000. On his return to Norwich he found his revenues sequestrated and his property pillaged. He rented a small farm at Higham, near Norwich, to which he retired (1647), and died Sept. 8, 1656. His works, mostly of a controversial character, have been published, with autobiography, notes, etc., by Pratt (London, 1808); Peter Hall, a descendant of Joseph (Oxford, 1837–39); and Philip Wynter (ib., 1863). Of his other works, the most widely read are his devotional treatises (*Select Devotional Works,* 1830), in seven parts, of which a number have been separately reprinted. His poetical *Satires,* written at college, were praised by Pope. His poems were edited by Grosart (Manchester, 1879); his satires by Singer (1824). For his life, consult G. Lewis (London, 1886).

HALL, Lyman (1725–90). A signer of the Declaration of Independence. He was born in Connecticut and remained there until his graduation from Yale College in 1747, after which he removed to the parish of St. John in Georgia. This parish was largely peopled by New Englanders, and to them is chiefly due Georgia's final decision to throw in her lot with the other Colonies. The people of this parish, disgusted with the indecision of their fellow colonists, endeavored to ally themselves with the Committee of Correspondence in Charleston, S. C., and when this proved infeasible decided to refrain from trading with the other colonists of Georgia and particularly with the people of Savannah. In 1775 they sent Hall as their delegate to Congress, where he was allowed to debate, but, being the only representative of Georgia, could not vote when the voting was done by whole Colonies. Soon afterward Georgia joined her sister Colonies and elected five delegates to the Congress, among them Hall. He was reëlected in 1776 and again in 1780. He served as Governor of Georgia from 1783 to 1785, his administration being characterized by energy and efficiency.

HALL, Marshall (1790–1857). An eminent English physiologist and physician, born at Basford, Notts. At the age of 20 (having been previously apprenticed to a chemist) he entered on the study of medicine at the university of Edinburgh, where, in 1812, he took his degree of M.D. After three years' subsequent attendance at the leading schools of medicine on the Continent, he commenced practice in Nottingham in 1815 and rapidly obtained a high provincial reputation. In 1826 he removed to London, where his career as a physician was eminently successful. His name is well known in connection with the doctrine of the reflex function of the nervous system. He admitted that the phenomena of which he treated had been long known to physiologists; but he believed himself to have been the first to show their independence of sensation, to bring them together under one generalization, to establish with precision the laws of their production, to assign them their just rank in physiology, and to apply the doctrine to the elucidation of disease. His last bequest to the science of medicine and the cause of humanity was the description of a simple and easily applied method of restoring suspended respiration, which has been the means of saving many from untimely death and is known as "the Marshall Hall method." It is briefly as follows: The insensible person is laid on his back. His mouth is opened, and the tongue, grasped with a towel or handkerchief, is pulled forward. The lower part of the body is then elevated for a moment, to let water in the larynx and mouth run out by gravitation. The body is then laid on its back, with the left arm bent backward and upward, and placed under the head. The body is then gently rolled over on the face, the tongue being held forward, and then rolled back again. The object kept in view is to compress the thorax and empty the lungs by means of the weight of the body. The manœuvre must be repeated once every four seconds, deliberately, and preferably by the watch; for rescuers are apt to be too hasty and to perform the manipulation incompletely through nervousness. This method of resuscitation has been largely superseded by the Sylvester and Satterthwaite methods. See Respiration.

HALL, Owen (real name, James Davis) (1853–1907). An English dramatic author. He was educated at University College, London, and practiced as a solicitor in London from 1874 to 1886. In the latter year he gave up the law for journalism. He was editor of the *Bat* in 1885–87, assistant editor of *Galignani's Messenger* in 1888–90, and in 1899 founded and became editor of a weekly magazine known as the *Phœnix.* He is best known for his musical comedy librettos, such as *A Gayety Girl, An Artist's Model, The Geisha, A Greek Slave, Florodora,* and *The Silver Slipper.*

HALL, Robert (1764–1831). A celebrated English Baptist preacher and writer. He was born at Arnesby, near Leicester, May 2, 1764, the son of a Baptist minister and the youngest of 14 children. He was feeble in body and precocious in intellect. At the age of 15 he was sent to a Baptist academy at Bristol. In 1781 he entered King's College, Aberdeen. Graduating M.A. in 1784, he became (1785) assistant Baptist minister and tutor in the academy at Bristol. He was a fluent, rapid, and impressive speaker, and was liberal, but not heterodox, in his religious views. In consequence of a disagreement with his colleague, he went, in 1790, to Cambridge, where, by his elaborate composition and vivid eloquence, he rose to the highest rank of British orators. He was not less distinguished for his writings and published discourses. His *Apology for the Freedom of the Press* (1793) and sermon on *Modern Infidelity* (1800) extended his reputation. In 1806 he resigned because of poor health, and in 1807 he settled in Leicester. He married in 1808, after a whimsical courtship, returned to Bristol in 1826, and died there Feb. 21, 1831. He was an indefatigable student, learning Italian at 60 that he might enjoy Dante. Nearly all his life he suffered from ill health and had at times attacks of insanity; yet few men have performed more intellectual labor. A complete edition of his works, with a memoir by Dr. O. Gregory, and observations on his character as a preacher by John Foster, was published in London, in six volumes (1831–33; 11th ed., 1853). His miscellaneous works are in Bohn's *Standard Library.* Another edition with a supplementary volume was published in New York (1857) and an edition of his *Work* *of the Holy Spirit* appeared in London (1886). Consult his life, by Hood (London, 1881).

HALL, Samuel Carter (1800–89). A British author and editor, born near Waterford, Ireland. He went to London in 1821, became a reporter of debates in the House of Lords in 1823, commenced a year later the study of law, though he never practiced, and had a varied experience as editor of magazines and books. In 1824 he married Anna Maria Fielding (see Hall, Anna Maria), who became well known as a skillful delineator of Irish life and customs. He edited the London *Art Journal* from 1839 to 1880, introduced during his period of supervision the engraving of sculpture and other innovations, and exposed the prevalent frauds in the sale of pictures alleged to be by the old masters. In 1880 he was granted a pension by Lord Beaconsfield. He frequently collaborated with his wife; rendered her valuable assistance in the preparation of her very popular *Ireland,* descriptive of picturesque Irish scenes; and he edited extensively, and notably *The Book of British Ballads* (1842) and *The Gallery of Modern Sculpture* (1849–54). The best known among his original works are: *Memoirs of Great Men and Women . . . from Personal Acquaintance* (1871); *The Trial of Sir Jasper: A Temperance Tale in Verse* (1873); *An Old Story: A Temperance Tale in Verse* (1875); *A Memoir of Thomas Moore* (1879); *Rhymes in Counsel; Aphorisms Versified* (1881); *Retrospect of a Long Life, from 1815 to 1883* (1883).

HALL, Thomas Cuming (1858–). An American Presbyterian theologian, son of the Rev. John Hall (1829–98). He was born at Armagh, Ireland, graduated from Princeton University in 1879 and from Union Theological Seminary in 1882, and studied at Berlin and Göttingen in 1882–83. Ordained in 1883, he held pastorates at Omaha, Neb. (1883–86), and Chicago (1886–97), and in 1898 became professor of Christian ethics at Union Seminary. In 1914 he was chosen to be Roosevelt professor at the University of Berlin during 1915–16. He was decorated with the order of the Crown by the Emperor of Germany. His writings include: *The Power of an Endless Life* (1893); *The Social Meaning of the Modern Religious Movements in England* (1900); *The Messages of Jesus According to the Synoptists* (1901; 1908); *John Hall, Pastor and Preacher: A Biography by his Son* (1901); *Social Solutions in the Light of Christian Ethics* (1910); *The History of Ethics within Organized Christianity* (1910); *Historical Setting of the Early Gospel* (1912); *Religion and Life* (1913).

HALL, William Edward (1835–94). An English writer on international law, born at Leatherhead. He was educated at University College, Oxford, where he took the degree of B.A. in 1856 and M.A. in 1859, and in the latter year won the chancellor's prize for a notable essay on *The Effect Produced by the Precious Metals of America upon the Greatness and Prosperity of Spain.* He studied at Lincoln's Inn, and was called to the bar in 1861, but turned his energies towards a study of modern history and international law. He traveled widely and became well known as an art collector, upon which subject he also wrote extensively. In 1867 he attracted public attention by the publication of an able treatise entitled *A Plan for the Reorganization of the Army.* In 1874 appeared his first work on international law, *The Rights and Duties of Neutrals.* This was followed in 1880 by his great work, *International Law,* the publication of which marked an epoch in the literature of the subject and secured for its author at once recognition as one of the greatest living authorities in that branch of law. The book reached a fourth edition in 1895 and was accepted as a standard work in Europe and America as well as in England. He also wrote *A Treatise on the Foreign Powers and Jurisdiction of the British Crown* (1894). He was elected in 1882 a member of the Institut de Droit International and in 1891 was appointed one of the English commissioners for the settlement of the Newfoundland fisheries question with France.

HALL, Winfield Scott (1861–). An American physician and writer on physiology and sex hygiene, born at Batavia, Ill. In 1887 he graduated from Northwestern University (M.D., 1888; M.S., 1889), and there became professor of physiology in 1895 and junior dean of the medical faculty in 1901; he studied also at the University of Leipzig (M.D., 1894). He was professor of biology at Haverford College (Pa.) in 1889–93 and lectured on dietetics and physiology at training schools for nurses. In 1904–05 he was president of the American Academy of Medicine, and he became president of the Child Conservation League of America. Among his many books are: *Laboratory Guide in Physiology* (1896); *Anatomy of the Central Nervous System in Man and Vertebrates* (1899); *Intermediate Physiology and Hygiene* (1901); *Text-Book of Physiology, Normal and Pathological* (2d ed., 1905); *The Biology, Physiology, and Sociology of Reproduction, also Sexual Hygiene* (1906; 14th ed., rev., 1914); *Nutrition and Dietetics* (1910; 2d ed., 1913); *Father and Son* (1913).

HAL'LAM, Arthur Henry (1811–33). An English essayist, son of Henry Hallam the historian. He was a young man of great promise and was educated at Eton, and at Trinity College, Cambridge. On graduating in 1832, he began the study of law; but the next year went abroad with his father, and died suddenly at Vienna. At Cambridge he formed a close friendship with Alfred Tennyson, to whose sister he was engaged to be married. Hallam's name has been rendered memorable through its connection with Tennyson's "In Memoriam," in which the poet employs the premature death of his friend as the starting point of the well-known elaboration of his views on life and death. Hallam's *Remains in Prose and Verse* were published in 1834. Consult F. M. Brookfield, *Cambridge Apostles* (New York, 1906).

HALLAM, Henry (1777–1859). An English philosophical historian and critic. He was the only son of John Hallam, dean of Bristol and canon of Windsor, and was born in Windsor on July 9, 1777. He was educated at Eton, and at Christ Church, Oxford, where he graduated B.A. in 1799; studied law at the Inner Temple, of which society he became a bencher; and was in practice on the Oxford circuit until 1812, when an inheritance, through his father's death, together with a government sinecure, allowed him to follow his natural bent for historical study and literary work. His literary aptitude had been early exhibited by precocious productions in the *Musæ Etonenses* (1795), and his contributions to the *Edinburgh Review* and other periodicals soon brought him into prominence among the most noted writers of the day. His first extended work, *A View of the State of Europe during the Middle Ages* (1818), was the result of 10 years' preparation, occasionally relieved by intervals of continental travel. His other important works are: *The Constitutional History of England from the Accession of Henry VII to the Death of George II* (1827), and *Introduction to the Literature of Europe in the Fifteenth, Sixteenth, and Seventeenth Centuries* (4 vols., 1837–39). Marked by conscientious and extensive research in original sources, by impartial analysis and criticism, together with ease and lucidity of style, these works long remained standard authorities, unsurpassed in their accuracy of details by the more extended modern works which have replaced them in the estimation of scholars. They went through several editions and were translated into the leading European languages. In politics Hallam was a Whig; his candor and general temperament, however, unsuited him for the conflicts of parties, and he took no active part in them, but he displayed a genuine interest in all questions of social improvement. He acted with the Wilberforce party for the abolition of slavery, as well as in other humane schemes, and was one of the original promoters of the Society for the Diffusion of Useful Knowledge. In 1830 he was one of the recipients of the two 50-guinea gold medals given by George IV for historical preeminence. Washington Irving received the other medal. Other honors included a D.C.L. degree, fellowship of the Royal, Antiquarian, and other learned societies, and trusteeship of the British Museum. Hallam's life was saddened by much domestic affliction, 10 out of his 11 children, and his wife, having died before him. One of his sons, Arthur Henry, was the A. H. H. of the "In Memoriam" of Tennyson.

HALLAM, ROBERT, BISHOP OF SALISBURY (c.1360–1417). An English ecclesiastic. Educated at Oxford, he was a prebendary of Salisbury Cathedral by 1394, and six years afterward was Archdeacon of Canterbury. After having been chancellor of Oxford University (1403–05), he was made Bishop of Salisbury in 1407 and Cardinal in 1411. He was the most prominent English representative at the Council of Constance, where he was a leader of the party which tried to assert the supremacy of the Papal Council over the Pope. He died while the council was in session, and is buried in the cathedral at Constance.

HALLBERG-BROICH, häl'bĕrG-broiK, THEODOR MARIA HUBERT, REICHSFREIHERR VON (1768–1862). A German soldier and author, known also by the pseudonym Eremit von Gauting, born in the Duchy of Jülich. He entered the military service of the Electorate of Bavaria and subsequently, after extensive travels, even as far as Persia, became so active a patriot in the German cause that he was imprisoned by the French invaders for eight months in Paris. In 1813 he organized the militia forces enrolled between the Rhine and the Maas and on Jan. 6, 1814, crossed the Rhine at Coblenz in command of 30,000 troops. His writings, marked by original viewpoints and a somewhat bizarre style, include: *Reise durch Skandinavien* (1818); *Reise durch Italien* (1830); *Frankreich und Algier* (1837); *Reise nach dem Orient* (2 vols., 1839); *Reise durch England* (1841); *Deutschland, Russland, Kaukasus, Persien* (2 vols., 1844). Consult Giftel, *Leben des preussischen Generals Freiherrn von Hallberg-Broich* (Berlin, 1863).

HALLE, or HALLE AN DER SAALE, häl'ĕ än dĕr zä'le (Lat. *Halæ Saxonum*). An important city in the Prussian Province of Saxony, situated on the right bank of the Saale and on a number of islets, in lat. 51° 29′ N. and long. 11° 58′ E., 21 miles by rail northwest of Leipzig (Map: Germany, E 3). Halle has broad promenades on the site of its ancient fortifications and abounds in mediæval buildings and monuments. There are nine Evangelical and two Roman Catholic churches and a synagogue. Among the prominent churches are the splendid edifice of St. Maurice, founded in the twelfth century and containing a fine choir and altar, and a pulpit with reliefs; the sixteenth-century Marktkirche, with its four towers; and the cathedral, consecrated in 1523. The chief secular edifices and monuments are the Rathaus, dating from the fifteenth century and recently renovated; the Rote Turm, a clock tower 276 feet high, dating from the fifteenth century; the neighboring statue of Roland; a statue of Handel, who was born here; the new Rathaus, built in 1893, in the Gothic style; the remains of the Moritzburg, the former residence of the archbishops of Magdeburg; the Archbishop's residence, adjoining the cathedral and containing some valuable collections of the provincial museum; and, lastly, the buildings of the famous university. (See HALLE, UNIVERSITY OF.) The interesting cemetery is like an Italian *campo santo* and has handsome arcades. Besides the university the educational institutions include a Gymnasium, the Francke Institutions, the provincial museum with prehistoric antiquities, the municipal museum devoted to art, and the municipal theatre. The Francke Institutions, founded in 1691 by August Hermann Francke, include eight schools of various grades, among them a Latin school (Gymnasium), a Realschule, a girls' high school, and a normal school. Halle has a zoölogical garden and important hospitals and is the seat of numerous historical, scientific, and economic societies.

It is a very important industrial town. At the head of the local industries for centuries has been the production of salt, which is obtained on an islet of the Saale, the yearly output amounting now to nearly 9000 tons. The workmen engaged in the salt works are known as Halloren and differ from the rest of the population in dialect and dress. In olden times they formed a separate guild, some of the privileges of which they still retain. The metal industries developed greatly during the second half of the nineteenth century, and Halle has now over 50 large establishments for the manufacture of machinery, besides numerous establishments for the production of other iron and copper articles. There are also many starch factories. Additional manufactures are chemicals, chocolate, cocoa, chicory, malt, sugar, beer, spirits, etc. There is a considerable publishing business. Sugar beets are raised in the vicinity, and there are brown-coal mines. The commerce, mostly in grain, sugar, machinery, and colonial goods, is quite extensive, a considerable part of the traffic being by river. The town has good railroad connections. There is an electric street railway.

Halle is administered by a chief burgomaster, a burgomaster, an executive board of 16, and a municipal council of 54 members. The city owns the water works, two gas plants, an electric plant since 1900, and an abattoir. The population of Halle increased notably during the second half of the nineteenth century. This was in part due to its excellent facilities of communication; it is at the junction of six important railway lines. The population increased from 52,620 in 1871 to 71,484 in 1880, 101,401 in 1890, and 156,609 in 1900. The increase shown in the figure for 1900 was in some degree due to the annexation of suburbs. Of the population in 1900, 147,713 were returned as Evangelical, 6816 as Roman Catholic, and 1258 as Jewish. The area of the city in 1900 and in 1910 was 40 square kilometers (15.4 square miles); population, according to the census of the latter year, 180,843.

Halle, first mentioned about 800 as the castle of Halla and as a town in 1064, is of very ancient origin. It was presented by Otho I to the archbishopric of Magdeburg and began to grow in importance with the foundation of the monastery of Neuwerk in 1116. As a member of the Hanseatic League, it attained considerable commercial prominence and succeeded in freeing itself from the rule of the archbishops of Magdeburg. Its independence, however, was of short duration, owing to the internal conflicts between the common people and the patricians, which gave Archbishop Ernest an opportunity to regain the town in 1478. The Reformation became an issue in Halle in 1522, and in 1541 a Lutheran superintendent was appointed. By the Treaty of Westphalia the town came into the possession of Brandenburg. Taken by the French in 1806, it was annexed to Westphalia in the following year and passed to Prussia in 1813. Consult: Hertzberg, *Geschichte der Stadt Halle*, vols. i–iii (Halle, 1889–92); Schrader, *Geschichte der Friedrichs-Universität zu Halle* (Berlin, 1894); E. J. James, *Municipal Administration in Germany, as Seen in the Government of a Typical Prussian City, Halle* (Chicago, 1901); *Halle in der Gegenwart*, edited by Max Reinns (Halle, 1907).

HALLE, ȧl, ADAM DE LA. See ADAM DE LA HALLE.

HALLÉ, hăl′lĕ, SIR CHARLES (or KARL HALLE) (1819–95). A German-English pianist and conductor. He was born at Hagen in Westphalia, his father being the town kapellmeister, and was regarded when but a young child as a musical prodigy. After serious study with Rinck at Darmstadt, he went to Paris (1836), where he laid the foundation of all his subsequent success. He earned for himself a solid reputation during the 12 years of his stay there and was in friendly contact with Cherubini, Chopin, Liszt, and Kalkbrenner. The political disturbances of 1848 caused his removal to London, where he was enthusiastically received. It was in Manchester, however, that he gained his most enduring fame and did his best and most important work. He had been appointed director in 1853 of the Gentlemen's Concerts and in 1857 commenced a series of subscription concerts with his famous orchestra, which up to the time of his death was the greatest musical educational factor in the north of England. Although his greatest interests were in Manchester, he was closely connected with the musical life of London, in 1861 performing all Beethoven's sonatas in eight matinée concerts. In 1880 he also produced Berlioz's *Faust* in the same city. In 1888 he was made Knight by the Queen (Victoria) and the same year married Madame Norman Neruda, with whom in 1890 and 1891 he made a tour of Australia. His compositions were entirely instrumental and included many orchestral arrangements and a method for the pianoforte. He died in Manchester. In 1896 his children published his autobiography under the title *Life and Letters of Charles Halle* (London).

HALLE, UNIVERSITY OF. A German university which came into existence through the rivalry between conservative Saxony and progressive Brandenburg, and because the Hohenzollerns desired to have a more centrally located Lutheran university than that at Königsberg. The new foundation was united with a Ritterakademie, already existing, and was formally opened in 1694, with over 700 students. Thomasius and A. H. Francke were the most influential in determining the progressive character of the institution, which has been called the first modern university. In the earlier half of the eighteenth century it was preëminently the chief resort for Protestant Germany, having 1500 students on the average; later on, Göttingen became a strong rival. From the beginning Halle was one of the leading theological schools of Germany—a distinction it has never lost, though it changed from its original pietism to a bold rationalism in the latter half of the eighteenth century. In the period of the Napoleonic wars the university was twice suspended for its strong Prussian utterances. In 1817 the old and honorable University of Wittenberg (founded 1502) was united with it. The main university building was erected in 1832–34; nearly all the others in the seventies and eighties; a building containing seminar rooms and an auditorium was added in 1902. Much attention is given to instruction in agriculture. Halle had in 1913 about 2900 students. The library, founded in 1696, contains over 263,932 volumes and 959 manuscripts, besides the Ponickau collection of books on Saxony and Thuringia, with 16,700 volumes and 35,000 pamphlets. Among the great names of Halle are those of Chr. Wolf, F. A. Wolf, Schleiermacher, Gesenius, Tholuck, Leo, and Bergk. Halle was also the seat of the scientific society Academia Naturæ Curiosorum, founded by J. B. Bausch in 1652 and now known as the Leopoldinisch-Karolinische Akademie. Consult W. Schrader, *Geschichte der Friedrichs-Universität zu Halle* (Berlin, 1894). See ACADEMY, passim.

HALLÉ, WILMA MARIA FRANCISCA, LADY. See NERUDA, WILMA MARIA FRANCISCA.

HAL′LECK, FITZ-GREENE (1790–1867). An American poet, born at Guilford, Conn., July 8, 1790. He was educated in Guilford, and in May, 1811, became a clerk in the New York bank of Jacob Barker, where he remained for 20 years. On May 15, 1832, he became the confidential agent of John Jacob Astor in his commercial affairs and was appointed by him one of the original trustees of the Astor Library in New York. In 1849 he retired to his native place, where he spent the remainder of his life. Halleck wrote verses from his boyhood, but in his collected poems he included nothing juvenile. In 1819 he became associated with Joseph Rodman Drake (q.v.) in contributing the humorous series of "The Croaker Papers" to the *Evening Post*. The illness of Drake soon put an end to these papers, and Halleck commemorated his friend's death in the most beautiful and best known of his poems, beginning "Green be the turf above thee" (1820). His longest poem, *Fanny*, published anonymously (December, 1819), is a satire on the literature, fashions, and politics of the time. It obtained a factitious popularity, but hardly repays reading. In 1822–23 Halleck visited Europe, and in 1827 published an edition of poems in one volume, among them the verses on "Alnwick Castle" and on "Burns." These, with "Marco Bozzaris" (1825), constitute his chief claim to remembrance as a poet of a slight though genuine lyric vein and of distinct capacity for society verse, who was yet artist enough to confine his production to a very moderate compass. He died at Guilford, Nov. 19, 1867. Consult Wilson, *The Life and Letters of Fitz-Greene Halleck* (New York, 1869), and *The Poetical Writings of Fitz-Greene Halleck*, edited by Wilson (ib., 1869).

HALLECK, Henry Wager (1815–72). An American soldier, the general in chief of the United States army from 1862 to 1864. He was born in Westernville, N. Y., on Jan. 16, 1815, studied for a time at Union College, and graduated at West Point in 1839. He then served for a year as assistant professor of engineering at West Point; was assistant to the board of engineers at Washington in 1840 and 1841; and from 1841 to 1846, except for a few months in 1845, when he was in Europe for the purpose of examining various public works, was assistant engineer in repairing the fortifications of New York harbor. Soon after his return from Europe he delivered a series of lectures before the Lowell Institute of Boston, which he published in 1846 as *Elements of Military Art and Science*, which in a new edition (1858) was much used during the Civil War as a training manual for volunteer officers. In 1847, during the Mexican War, he was sent to the Pacific coast and here served as aid-de-camp to Commander Shubrick from October, 1847, to June, 1848 (for part of this period serving as Lieutenant Governor of Mazatlán); was chief of staff during Lieutenant Colonel Burton's campaign in Lower California, and from August, 1847, to December, 1849, served as Secretary of State for California under the military governments of Generals Mason and Riley. In 1849 he was a member of the California Constitutional Convention and of the committee which drafted the State constitution. From December, 1852, to August, 1854, he was inspector and engineer of lighthouses, and from April, 1853, to August, 1854, was also a member of the board of engineers for fortifications on the Pacific coast. He resigned from the army on Aug. 1, 1854, became a successful lawyer in San Francisco, was elected president of the Pacific and Atlantic Railroad in 1855, and from 1850 until 1861 was director general of the New Almaden quicksilver mines. Soon after the outbreak of the Civil War he reëntered the army (Aug. 19, 1861), with the rank of major general, and from Nov. 9, 1861, to March 11, 1862, commanded the Department of Missouri, which then embraced Missouri, Iowa, Minnesota, Illinois, Arkansas, and western Kentucky. In this capacity he quickly put a stop to the peculations of contractors, thoroughly trained the disorganized troops, dismissed hundreds of placemen, and in general substituted order and system for the chaos which had resulted from his predecessor's laxity and incapacity. He planned the Western campaign of 1862 and on April 11 assumed command in person at Pittsburg Landing (Shiloh). On May 30 his forces entered Corinth. On July 11 he was appointed general in chief of the Armies of the United States and at once proceeded to Washington, where he served in this capacity until March 12, 1864, after which, until April, 1865, he was chief of staff of the army. He then was in command successively of the Military Division of the James, the Division of the Pacific, and the Division of the South until his death. As a soldier, he was a strict disciplinarian, an excellent organizer, and a skillful strategist; but his genius was more adapted to the map than to the field, and on many occasions he is considered to have exhibited both indecision and an inability to direct large movements. See the criticism in Rhodes, vol. iv. He published: *Bitumen: Its Varieties, Properties, and Uses* (1841); *A Collection of Mining Laws of Spain and Mexico* (1859); *International Law, or Rules Regulating the Intercourse of States in Peace and War* (1861; abridged ed. for schools and colleges, 1886); and a translation of Jomini's *Vie de Napoléon* (1864).

HALL EFFECT. See Electricity.

HALLEIN, häl′līn. A town in Salzburg, Austria, 10 miles south of the city of Salzburg, on the right bank of the Salzbach, 1450 feet above sea level (Map: Austria-Hungary, C 3). Its institutions include a school of forestry and lumbering and a town museum. It is noted for its extensive salt works and saline baths and has also important cotton, needle, and button factories. The Dürnberg, a mountain (2388 feet), contains the largest salt mine in the Austrian Salzkammergut. The salt is conveyed from it in large wooden conduits to the works within the town. Good rock salt is also obtained from Dürnberg. It also manufactures bricks, pottery, cement, celluloid, lumber, tobacco and beer. Hallein dates from the tenth century. Pop. (town), 1890, 5200; 1900, 6600; (district), 1900, 22,398; 1910, 24,600.

HAL′LEL (Heb., praise). A part of the Jewish hymnal service. The term usually signifies the Egyptian Hallel, so called because of its connection with the Passover festival. This Hallel comprises Ps. cxiii–cxviii and is chanted in synagogues on the festivals of the Passover, Pentecost, Tabernacles, and the eight days of the Hannukah festival, or Feast of Lights, and also at the close of the meal on the first evening of the Passover. It is supposed that this Hallel, or a part of it, is referred to as having been sung by Jesus and his disciples at the end of their last meal together in Matt. xxvi. 30; Mark xiv. 26. Another Hallel, called the "great Hallel," was a general thanksgiving chant. Jewish authorities dispute in the Talmud as to what Psalms it should include. Some identify it with the usual Hallel (Ps. cxiii–cxviii); others make it Ps. cxx–cxxxvi, cxxxv. 4–cxxxvi, or cxxxvi alone.

HALLELUJAH, hăl′lė-lōō′yȧ, or **ALLELUIA** (Heb. *Halelu Yāh*, praise ye Yahweh). An ascription of praise to God derived from its use in certain Psalms and in general use as an expression of thankfulness. It is retained in the Greek and Latin liturgies in the original form, and was so also by the Church of England in the first Prayer Book of Edward VI, though it is now translated by "Praise ye the Lord." Being an expression of gladness and triumph, it was appropriate to seasons and festivals which expressed these emotions. In the Greek liturgy it is used through all the year, but in the Roman Catholic church it is never used from Septuagesima to Easter; and in some mediæval office books the office of the Saturday before Septuagesima made a special mention of it, even personifying it, and taking a quaint and tender farewell of it: "Thou shalt go from us, O Alleluia; thou shalt return to us again in peace, O Alleluia." During the entire Easter season, on the contrary, and also in a slightly less degree during the octaves of Christmas, Epiphany, and Corpus Christi, it is used continually at the end of antiphons, introits, communions, and other parts of the service. The threefold repetition of it at the end of the mass, called the greater Alleluia, was in the Middle Ages sung by the deacon to a very prolonged melody, or neuma. See NEUMES.

HALLELUJAH VICTORY. The name given to the victory of the Britons over the Picts, at Mold, Flintshire, Wales, March 30, 430, from the war cry of the former, which had been suggested by St. Germanus, Bishop of Auxerre, on the eve of the battle.

HALLÉN, hȧl-lān′, JOHAN ANDREAS (1846–). A Swedish dramatic composer, born at Göteborg. He was educated under Rheinberger, Reineke, and Rietz, and from 1872 to 1878 was conductor of the Göteborg Musical Union, although he had important interests in Berlin and resided there most of the time. He composed several important operas, which received their first presentation at the Royal Opera, Stockholm, of which in 1892 he became musical conductor; and also published numerous German and Swedish songs. His music, not generally known outside of Sweden and Germany, is exceedingly popular among the Swedish singing societies of the United States. His compositions include the operas *Harald der Viking* (1881); *Hexfällan* (1896); *The Treasure of Waldemar* (1897); *Walborgsmessa* (1902); several ballads for chorus and orchestra, symphonic poems, and choral rhapsodies.

HALLER, häl′lẽr, ALBRECHT VON (1708–77). An eminent physiologist, anatomist, botanist, and poet, born at Bern, Switzerland. Two years after the death of his father, an able lawyer, he went, in 1723, to the University of Tübingen, where he became the pupil of the anatomist Duvernoy. In 1725 he removed to Leyden, where he obtained the degree of M.D. in 1727. He then visited London, whence he proceeded to Oxford and afterward to Paris, where for six months he studied anatomy and botany; later he became the pupil of Johann Bernoulli, the celebrated mathematician, at Basel. He returned in his twenty-second year to his native city and commenced practice as a physician. The professor of anatomy, Meig, having fallen ill, Haller undertook the duties of his class; he likewise devoted much of his time about this period to the botany of the Alps and also published a descriptive poem, *Die Alpen.* In 1735 he was appointed physician to the hospital, and shortly afterward principal librarian and curator of the cabinet of medals; but in 1736 he left Bern to become professor of medicine, anatomy, botany, and surgery in the new university at Göttingen. For the next 18 years he devoted himself wholly to teaching and to original research. He took an active part in the formation of the Royal Academy of Sciences of Göttingen, and the memoirs of the society contain many of his papers. During the period from 1736 to 1753 he published 86 works on medical subjects. He was appointed physician to the King of England in 1739. In 1753 he returned to Bern. Among his most important writings are his *Elementa Physiologiæ Corporis Humani* (1757–66)—by far the most important of his works—and his four *Bibliŏthecæ*, or critical catalogues of works on botany, surgery, anatomy, and medicine. Haller's eminence as a man of science was duly recognized in his own lifetime. He was ennobled by the Emperor of Germany in 1748, and the universities of Oxford and Utrecht in vain endeavored to obtain him as their professor. His name is especially connected with the doctrine of muscular irritability. (See MUSCLE.) While his name is indelibly recorded in the annals of science, it should also be remembered that by his work as a poet Haller greatly contributed to the movement which towards the end of the eighteenth century brought new life to German poetry. Others of his works were: *Icones Anatomicæ* (1743–50); *Opuscula Pathologica* (1755); *Opuscula Botanica* (1749). For his *Life*, consult Frey (Leipzig, 1879).

HAL′LERMUND, AUGUST, COUNT VON PLATEN. See PLATEN-HALLERMUND.

HALLES, ȧl, LES. A large building on the Grande Place of Bruges, Belgium, erected in the thirteenth century, now used as offices of the city government and as a market. Its massive belfry, 350 feet in height, is the subject of Longfellow's poem "The Belfry of Bruges." It contains a remarkable set of chimes dating from 1748.

HALLES CENTRALES, ȧl säɴ′trȧl′. The great central market of Paris, an enormous group of metal structures consisting of a system of pavilions planned to cover 22 acres. Between the pavilions are covered streets 48 feet in width, with a roof about 48 feet above the ground, intersected by an avenue 105 feet wide. Each pavilion is divided into 250 small shops, rented for 20 centimes a day, and beneath are cellars 12 feet in height.

HAL′LETT, BENJAMIN FRANKLIN (1797–1862). An American statesman and editor, born at Barnstable, Mass., son of Benjamin Hallet (1760–1849), the shipmaster and founder of sailors' Bethels. He graduated at Brown University in 1816 and was admitted to the bar, but turning to journalism he worked on a paper in Providence and then went to Boston, where he established in 1827 the *Advocate;* he made it the organ of the temperance Antimasonic party. In 1831 he ceased conducting it, because his crusades against Masonry, against slavery, and in behalf of temperance were ruining the subscription list. He turned against Henry Clay when the latter refused to commit himself to the Antimasonic party; and when Masonry no longer was an issue, Hallett joined the Democratic party. Long chairman of its national committee, he did much to secure the nomination of Pierce and Buchanan. He was appointed district attorney by the former in 1853 and wrote the Democratic platform in 1856.

HALLETTE, ȧ′lĕt′, A. (1788–1846). A French mechanic, born at Arras, where he founded a machine shop. He improved the hydraulic press used for the extraction of oil and invented a new system of propulsion tubes for atmospheric locomotives, the *tube propulseur Hallette.* Consult his monograph with that title (Paris, 1844).

HAL′LETTSVILLE. A city and the county seat of Lavaca Co., Tex., 102 miles by rail west by south of Houston, on the San Antonio and Aransas Pass Railroad and on the Lavaca River (Map: Texas, D 5). It trades largely in cotton, cottonseed oil, garden truck, dairy products, and live stock, and has several cotton gins, a cottonseed-oil mill, a creamery, etc. The water works and electric-light plant are owned by the municipality. Hallettsville was founded about 1838. Pop., 1910, 1379.

HALLEVI, Judah. See Judah, Ben Samuel.

HAL'LEY, Edmund (1656–1742). An English astronomer and mathematician, born at Haggerston, London, the son of a soap manufacturer. He was educated at St. Paul's School, and afterward at Queen's College, Oxford, which he entered in 1673. In 1676 he published a paper on the orbits of the principal planets; also observations on a spot on the sun, from which he inferred its rotation round its axis. In November of the same year he went to St. Helena, where for two years he applied himself to the formation of a catalogue of the stars in the Southern Hemisphere, which he published in 1679 under the title *Catalogus Stellarum Australium.* On his return he was chosen a fellow of the Royal Society and deputed by that body to go to Danzig to settle a controversy between Hooke and Hevelius as to whether it was more profitable to use telescopic or plain sights for astronomical observations. In 1680 he made a tour of the Continent, during which he met Cassini at Paris and with him observed the great comet of that year. Halley returned to England in 1681 and in 1682 made observations on the great comet which goes by his name, and the return of which he predicted. (See Comet.) His observations on the comets of 1680 and 1682 formed part of the foundation of Newton's calculation of a comet's orbit. In 1683 he published his theory of the variation of the magnet and the next year made the acquaintance of Newton. In 1686 Halley published an account of the trade winds and monsoons on seas near and between the tropics, and in 1692 his hypothesis relative to the change in the variations of the magnetic needle. In 1696 he was appointed deputy controller of the mint at Chester. To test the truth of his theory of magnetism by obtaining measures of the variations in different parts of the world, he was sent in 1698 in command of the war sloop *Paramour Pink* to the western Atlantic; but his crew mutinied, and he was obliged to return. The next year, however, he sailed again, and in 1701 he published his observations in *A General Chart of the Variation of the Compass,* for which he was rewarded by the rank of captain in the navy with half pay for life. Soon after he made a chart of the tides in the channel and surveyed the coast of Dalmatia for the Emperor of Austria. On the death of Wallis, in 1703, he was appointed Savilian professor of geometry at Oxford. In 1705 he published his researches on the orbits of the comets under the title *Astronomiæ Cometicæ Synopsis,* in which he predicted the return of the comet of 1682 in 1758. In 1713, on the resignation of Sir Hans Sloane, he became secretary of the Royal Society; in 1716 he made valuable experiments with the diving bell, which were afterward published; and in 1720, after the death of Flamsteed, he became Astronomer Royal. In this office, and engaged especially in studying the moon's motions, he passed the rest of his life. In 1729 he was chosen a foreign member of the Academy of Sciences, Paris. Halley was the author of numerous other researches of great importance besides those mentioned. His *Tabulæ Astronomicæ* did not appear till 1749. Among his principal discoveries may be mentioned the proper motions of the fixed stars, the long inequality of Jupiter and Saturn, and the slow acceleration of the moon's mean motion. He was the first to predict the return of a comet and also to recommend the observation of the transits of Venus with a view to determine the sun's parallax. Consult: Bailly, *Histoire de l'astronomie moderne* (3 vols., Paris, 1779–82); Delambre, *Histoire de l'astronomie au dix-huitième siècle* (ib., 1827); Wolf, *Geschichte der Astronomie* (Munich, 1877); Poggendorff, *Geschichte der Physik* (Leipzig, 1879); Grätzer, *Edmund Halley und Caspar Neumann* (Breslau, 1883).

HALLEY'S COMET. See Comet.

HALLGRÍMSSON, hăl'grĭms-sŏn, Jónas (1807–45). An Icelandic lyric poet and naturalist, born at Steinsstadir, and educated at Bessastadir. He studied at the University of Copenhagen in 1832 and in 1837–42 traveled through Iceland, making observations on the geology of the island. His knowledge of the German poets made him realize the decadent condition of Icelandic poetry, and he began to write poems in the pure Icelandic tongue. Animated with noble patriotism and deep love of Icelandic scenery and language, in 1835, together with Gíslason and Saemundsson, he established the periodical *Fjölnir* at Copenhagen. The aim of this publication, to which were contributed most of his poems and essays, was to waken the national spirit and to purify the language and inspire love of it. As an exquisite stylist he played a prominent part in the reformation of the Icelandic language in the nineteenth century. Although his lyric verse fills but one small volume, *Ljóđmæli og önnur rit,* its range is from the classical metres revived by him to the new foreign metres which he had introduced. Consult Fjölnnir, ix; biography in *Ljóđmæli og önnur rit* (Copenhagen, 1883).

HALLIARDS, hăl'yardz, or **HALYARDS** (probably a variant of *hallier,* from OS. *halian,* OHG. *halōn, holōn,* Ger. *holen,* Eng. *hale,* to haul; connected with Lat. *calare,* Gk. *καλεῖν, kalein,* to summon; explained by popular etymology as *haulyards,* or *haleyards*). Ropes used to hoist yards, gaffs, sails, etc. They usually take their name from the object hoisted—as, *topsail* halliards, *jib* halliards, *ensign* halliards, etc.; but in some instances they have other designations—the *crowfoot* halliards (so called because they are made fast to the awnings by several small lines spread out in fancied resemblance to a bird's foot), *throat* and *peak* halliards on gaffs, etc.

HAL'LIBURTON, William Dobinson (1860–). An English physiologist, born in London and educated at University College, London. He became a fellow of the Royal College of Physicians in 1890 and was assistant professor in 1883–89, and then professor of physiology, in University College, London. He was president of the physiological section of the British Association in 1902 and of the corresponding section of the British Medical Association in 1900 and 1906, and in 1911 received the Baly medal of the Royal College of Physicians. With Brodie (1893) and Pickering

(1897), he did important experimental work in intravascular injection of albino rabbits. He published: *Text Book of Chemical Physiology and Pathology* (1891); *Essentials of Chemical Physiology* (1901; 7th ed., 1909); *Chemical Side of Nervous Activity* (Croonian lectures, 1901); *Handbook of Physiology* (1902; 11th ed., 1913); *Biochemistry of Muscle and Nerve* (1904); *Physiology* (1911).

HAL'LIWELL-PHIL'LIPPS, James Orchard (1820–89). An English antiquary and biographer of Shakespeare, born in Chelsea, London. His taste for original research was exhibited while yet a student at Cambridge, and he was made a fellow of the Royal Society and of the Society of Antiquaries when but 18 years old. After the founding of the Shakespeare Society in London (1841), he gradually devoted more and more of his time to the study of the great dramatist. Rejecting the popular method of constructing the poet's biography from internal evidence, Halliwell discredited the personal application even of the sonnets and set himself through years of investigation to collect and sift contemporary and traditional evidence to be found chiefly in Stratford on Avon and neighboring villages. The result of his labor was issued in his *Outlines of the Life of Shakespeare* (1881), which in 1913 had run through 10 editions. Before he left the ranks of Shakespearean critics he had published a superb folio edition of the plays (16 vols., 1852–65). In 1863 he was largely instrumental in preventing the sale of Shakespeare's birthplace, and the foundations of New Place, where he died, and he aided generously in turning the one into a museum and clearing the site of the other. Ever open to give and receive suggestions or criticisms from other Shakespearean students, his assistance was valuable, both directly and indirectly, through the collections of old literature and Shakespearean and other documents which he presented or bequeathed to the Chetham Library, Manchester (1851), Smithsonian Institution, Washington (1852), the Penzance Public Library (1868–88), the Edinburgh University Library (1872), and the Birthplace Museum (1889). Many of his own numerous books were printed for private circulation only. Among his works may be mentioned *Nursery Rhymes and Nursery Tales of England* (1845), and *Dictionary of Archaic and Provincial Words* (1847), which has been often reprinted.

HALL MARKS. See Plate Marks.

HAL'LOCK, Gerard (1800–66). An American journalist, born at Plainfield, Mass. He graduated at Williams College in 1819, taught at Amherst Academy (1819–21), and after a short course at Andover, at Salem. In 1824 he started the Boston *Telegraph*, which was united with the *Recorder* a year later. He acquired a part interest in the New York *Observer* in 1827, and in 1828 joined David Hale in the management of the *Journal of Commerce*. He built a schooner, the *Evening Edition*, which met incoming vessels at Sandy Hook and brought back news; and in 1833 established a pony express between New York and Philadelphia, which gave the *Journal of Commerce* another great advantage. Hallock opposed abolition, but did much to further liberation of the slaves. He was one of the founders of the Southern Aid Society (1854); and in 1861 the use of the mails was forbidden his paper, and he was indicted for "encouraging rebels." Unwilling to give up his principles, he retired from journalism and lived at Hallock's Castle in New Haven, where he was known as a liberal and generous citizen. Hallock was one of the founders of the Associated Press of New York. Consult *Life of Gerard Hallock* (New York, 1869).

HALLOCK, William (1857–1913). An American physicist. He was born at Milton, N. Y., and graduated from Columbia College in 1879. After receiving the degree of Ph.D. from the University of Würzburg, Germany, in 1881, he was physicist of the United States Geological Survey from 1882 to 1891, serving also as professor of physics at the Corcoran Scientific School, Washington, in 1884–86 and as professor of chemistry and toxicology at the National College of Pharmacy in 1889–92. After having had charge of the Astrophysical Observatory of the Smithsonian Institution for one year, he returned to Columbia as adjunct professor of physics in 1892. He became full professor in 1902 and was dean of the faculty of pure science in 1906–09. He published *Outlines of the Evolution of Weights and Measures and the Metric System* (1906).

HALLOCK, William Allen (1794–1880). An American editor, brother of Gerard Hallock. He was born at Plainfield, Mass., and was educated at Williams College and at Andover Theological Seminary. From the foundation of the American Tract Society (1825), he was its corresponding secretary until 10 years before his death. He edited the *American Messenger* and, in addition to his labors as editor and reviser of the publications of the society, wrote several biographies—*Harlan Page* (1835), which attained a circulation of more than 100,000 copies; *Moses Hallock* (1854); *Justin Edwards* (1855)—and many tracts. Consult Knight, *Memorial of William Allen Hallock* (New York, 1882).

HALL OF FAME. See Walhalla.

HALL OF FAME FOR GREAT AMERICANS. A structure on the grounds of the New York University, completed in 1900 and designed to commemorate the achievements of distinguished citizens of the United States. It consists of a colonnade, 500 feet in length, following the curve of a terrace which supports three of the university buildings, and resting on a granite corridor which contains a long hall and five rooms, intended for a museum for the preservation of portraits and mementos of those whose names are inscribed in the colonnade. The colonnade contains 150 panels 7 feet long and 1¼ feet high, designed to be filled by bronze tablets bearing the name of the person commemorated, the dates of his birth and death, and a selection from his writings. The agreement between the university and the donor of the Hall of Fame provided that no name shall be inscribed except of a person born in what is now the territory of the United States, and of a person who has been dead at least 10 years. This rule was modified later to admit the names of distinguished Americans of foreign birth. A small hall, modeled on the Nike Apteros hall at Athens, at the north end of the colonnade will balance the Hall for American Women at the south end. Fifty names, if selected, were to be inscribed during 1900, and five additional names every five years thereafter, completing the full number by the year 2000. Nominations were received from the general public by the University Senate, who transmitted the names seconded by any member to a board of 100 electors selected from educators, writers, and others interested in American history, 51 votes being necessary to a choice, subject to the final approval of the University Senate. The first 50 names were required to include representatives of a majority of 15 classes; authors and editors; business men; educators; inventors; missionaries and explorers; philanthropists and reformers; clergymen and theologians; scientists; engineers and architects; lawyers and judges; musicians, painters, and sculptors; physicians and surgeons; rulers and statesmen; soldiers and sailors; distinguished men and women outside these classes. Panels left vacant by these restrictions may be filled the ensuing year. The announcement of the new foundation created wide interest. It was favorably considered by the press, and some papers offered prizes for the lists of names which should approach most closely to the final choice of the electors. The Senate received over 1000 names, of which 200 were submitted to the electors, who were themselves invited to add to the nominations. From the names suggested, the electors chose 29, as follows: George Washington, Abraham Lincoln, Daniel Webster, Benjamin Franklin, Ulysses S. Grant, John Marshall, Thomas Jefferson, Ralph Waldo Emerson, Robert Fulton, Henry Wadsworth Longfellow, Washington Irving, Jonathan Edwards, Samuel F. B. Morse, David G. Farragut, Henry Clay, George Peabody, Nathaniel Hawthorne, Peter Cooper, Eli Whitney, Robert E. Lee, Horace Mann, John James Audubon, James Kent, Henry Ward Beecher, Joseph Story, John Adams, William Ellery Channing, Gilbert Stuart, Asa Gray. Of the remaining names, those which received the votes of 10 or more electors were by that fact placed in nomination for the next election. In 1905 the electors chose the names of Lowell, Whittier, J. Q. Adams, James Madison, John Paul Jones, Alexander Hamilton, William T. Sherman, Louis Agassiz, Maria Mitchell, Emma Willard, Mary Lyon. In 1910 the names chosen were Harriet Beecher Stowe, Oliver Wendell Holmes, Edgar A. Poe, James Fenimore Cooper, William Cullen Bryant, George Bancroft, John Lothrop Motley, Frances E. Willard, Phillips Brooks, Roger Williams, Andrew Jackson.

HALLOPEAU, ȧ′lō̇′pō̇′, François Henri (1842–). A French physician, born in Paris and educated there. He was appointed hospital physician in 1877, held a professorship in the faculty of medicine of Paris University after 1878, and became a member of the Academy of Medicine in 1893. From 1884 to 1907 he was on the clinical staff of the Hôpital Saint-Louis. Besides special monographs on diseases of the skin, Hallopeau wrote a standard *Traité élémentaire de pathologie générale* (1884; 4th ed., 1893); *Traité pratique de dermatologie* (1900); *Traité de la syphilis* (1911), in collaboration.

HAL′LORAN, Lawrence Hynes (1766–1831). An English writer of prose and verse, born probably in Ireland. He was first a teacher in a private school near Exeter. Afterward he took orders and was chaplain in the English fleet during the battle of Trafalgar. He published a descriptive poem, "The Battle of Trafalgar," in 1806. He went to South Africa as chaplain to the forces there, but, owing to his defense of two officers court-martialed for dueling in 1810, and his satirical pamphlet, *Cap-Abilities, or South African Characteristics* (1811), he was banished. On his return to England he led a wandering life and was ultimately condemned (1818) to seven years' transportation for forgery. He opened a school in Sydney, Australia, where he died. His works include *Odes, Poems, and Translations* (1790), and *The Female Volunteer* (1801), a drama.

HAL′LOWELL. A city in Kennebec Co., Me., 2 miles south of Augusta, on the Kennebec River, and on the Maine Central Railroad (Map: Maine, C 4). It is the seat of the Maine State Industrial School for girls and has a public library. There are white granite quarries, shoe and sandpaper factories, and an iron foundry. The city owns its water works. Pop., 1900, 2714; 1910, 2864.

HALLOW-EVEN, or **HALLOWE'EN.** The name popularly given to the eve or vigil of All Hallows, or festival of All Saints, which being the 1st of November, Hallowe'en is the evening of the 31st of October. In England it was customary to crack nuts, duck for apples in a tub of water, and perform other harmless fireside revelries, which were survivals of the festival of Pomona, on the 1st of November. Still older were the Hallowe'en fires, survivals of Druidical ceremonies. Consult: Brand, *Popular Antiquities*, edited by Ellis (London, 1813); Chambers, *Book of Days* (2 vols., Philadelphia, 1911); Schell, *Hallowe'en Festivities* (New York, 1904); Frazer, *Balder the Beautiful* (ib., 1913).

HALLOW FAIR. A market held in some places in Scotland during November, i.e., at Hallowtide.

HALLOY, ȧl′wȧ′, J. B. J., Baron d'Omalius d'. See Omalius d'Halloy.

HALLSTATT (häl′stȧt) **EPOCH.** The name applied to the last stage of bronze or the first stage of iron culture in Europe. It is so called from the necropolis of Hallstatt, Upper Austria, near the border of Salzburg. It is associated with the Celtic language group and the Alpine race of Ripley, who characterizes the Hallstatt culture of the eastern Alpine highlands as more highly evolved than that of the Neolithic period in the West due to Oriental influences. It appeared 1000 years or more before the Christian era. It flourished chiefly in Carinthia, southern Germany, Switzerland, Bohemia, Silesia, Bosnia, southeastern France, and southern Italy. See Neolithic Period.

HALLSTRÖM, hăl′strẽm, Ivar (1826–1901). A Swedish composer, born in Stockholm. He was educated for the legal profession and was private librarian to the Crown Prince, who became Oscar II of Sweden. In 1861 he was appointed the successor of Lindblad as director of the National School of Music at Stockholm. He is essentially a national composer, and all his writing is marked by the characteristics of Scandinavian music in general and the Swedish folk music in particular. He composed several operas, the most successful of which was *Den Bergtagna*, or the *Mountain King*. Other works include the operas *Hertig Magnus; Neaga*, or *Nyaga* (libretto by Carmen Sylva); *Wikingerfahrt; Per Swynaherde; Granadas Daughter;* several operettas; *Idyl* for soli, chorus, and orchestra, which in 1860 won the prize of the Musical Union of Stockholm.

HALLSTRÖM, Per (August Leonard) (1866–). A Swedish author, born in Stockholm and educated at the technical institute there. He was an industrial chemist in Chicago in 1888–90, and began to write on his return to Stockholm, where he was employed in the bureau of telegraphs in 1891–97. He was dramatic critic in 1904–05 for *Dagens Nyheter.* In 1908 he became a member of the Swedish Academy. His first published work was a volume of poems, *Lyrik och fantasier* (1891), but he is better known for his romantic fiction and dramas. His novels and romances include: *Purpur* (1895); *En gammal historia* (1895); *Briljantsmycket* (1896); *Döda Fallet* (1902), probably his best novel; *Gustaf Sparfverts roman* (1903); *En skälmroman* (1906); *Nya noveller* (1912); and his dramas: *Grefven af Antwerpen* (1899); *Bianca Capello* (1900); *En veneziansk komedi* (1901); *Erotikon* (1908); *Två Legenddramer* (1908); *Två Sagodramer* (1910).

HALLU′CINA′TION (Lat. *hallucinatio,* from *hallucinari, alucinari,* to wander in mind, dream, from Gk. *ἀλύειν, alyein,* to wander in mind) may be roughly defined as the apparent perception of some external thing to which no real object corresponds. "Hallucination" is thus to be distinguished from "illusion," which is a distorted or mistaken perception of some actual object. For example, if a rope lying on the ground is perceived as a snake, we have an illusion; but if a snake is perceived, and there is no rope or any similar object on the ground, we have an hallucination. (See ILLUSION.) An hallucination is, therefore, purely imaginary in character; yet the imaginary experience is so vivid, and its "feel" is so real, that it simulates an actual perception. The image which forms the basis of the hallucinatory experience is probably an image of the imagination, and not (as was formerly supposed) an image of memory. (See MEMORY; IMAGINATION.) Hallucinations are ordinarily auditory or visual, though they may also arise within the spheres of taste, smell, and touch. Furthermore, insane persons often complain of peculiar experiences which have their origin in the field of organic and kinæsthetic sensation; the bones are broken, the brain is dried up, there is no stomach, and so forth. In these cases, it is, however, difficult to say whether we are in presence of hallucinations or illusions.

The commonest forms of hallucination are, perhaps, the "hypnagogic" visions or voices seen or heard in the drowsy interval preceding sleep. Sane persons, especially those engaged in intellectual pursuits, are liable to hallucinations after a period of concentrated mental work, and when in an anæmic or neurasthenic condition. The most typical hallucinations, however, are found in certain forms of insanity, where (as in delirium) they may be the only abnormal symptom. Indeed, all toxic states, when acute, are accompanied by hallucinations; and these, if other symptoms are lacking, may indicate the nature of the disease. In dementia præcox, hallucinations are common, and lead to the abnormal impulsive actions characteristic of this form of mental disease; in paranoia they form the foundation upon which the subsequent structure of delusions of persecution and ideas of grandeur is built; in mania also they are not infrequent, though usually elementary and transitory.

The presence of hallucinations usually indicates a grave condition, although accumulations of wax in the ear, catarrh or polypi in the nasal passages, enlarged tonsils, decayed teeth, etc., may lead to their arousal. In general, hallucinations may be set up by hyperæmia of the brain membranes and cortex; by the action of drugs (alcohol, morphine, ether, etc.); and by disturbances of brain nutrition, resulting in anæmia. The common factor in all these cases seems to be a deposition, in the cerebral cortex, of products of decomposition, which at first enhance the irritability of the area affected, and presently serve themselves as stimuli to brain action. Consult: Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig, 1911); Mueller, *Ueber die phantastischen Gesichtserscheinungen* (Coblenz, 1826); Sully, *Illusions* (New York, 1881); Parish, *Hallucinations and Illusions* (ib., 1897); White, *Outlines of Psychiatry* (ib., 1913); Sidis, *The Foundations of Normal and Abnormal Psychology* (ib., 1914).

HAL′LUF. See WART HOG.

HALLUIN, ȧ′lwăN′. A town in the Department of Nord, France, situated on the River Lys, which here forms the Belgian frontier. It has extensive manufacturing establishments of cotton, linen, chairs, oil, chocolate, and beer. Pop., 1901 (commune), 16,600; 1911, 15,480.

HAL′LUX VAL′GUS (Lat., wry toe). The technical name of a deformity of the great toe, which is generally caused by wearing too small a shoe, the toe, for lack of room, being forced out of its normal position so that it sometimes overlaps the other toes. This malformation, which is most common among women, not unfrequently results in osseous changes which may necessitate amputation of the toe. The head of the first metatarsal bone frequently becomes enlarged from chronic periostitis; and a bursa may form in this region, constituting a bunion (q.v.), which may undergo inflammation.

HALLWACHS, häl′väks, WILHELM (1859–). A German physicist, born in Darmstadt and educated at Strassburg and Berlin. He became a lecturer at Leipzig in 1886 and at Strassburg in 1888, and professor at the Dresden technical institute in 1893, at Giessen in 1899, and in 1900 again at Dresden. His most important work was on the ultra-violet rays; and the photo-electric phenomenon known as the "Hallwachs effect" was discovered by him in 1888.

HALLWICH, häl′vĭk, HERMANN (1838–1913). An Austrian politician and historian, born at Teplitz and educated at Prague. From 1871 to 1897 Hallwich was a member of the Austrian House of Deputies, allied with the German Left, and prominent as a speaker on questions dealing with commerce and tariff. As an historian he is best known as an ardent defender of Wallenstein. He wrote: *Wallensteins Ende: Ungedruckte Briefe und Akten* (2 vols., 1879); *Heinrich Matthias Thurn als Zeuge im Prozess Wallenstein* (1883); *Gestalten aus Wallensteins Lager* (1885); *Fünf Bücher Geschichte Wallensteins* (1910).

HALM, hälm, FRIEDRICH, the pseudonym of MÜNCH-BELLINGHAUSEN, E. F. J., Baron von (q.v.).

HALM, KARL FELIX (1809–82). A German classical scholar, born at Munich. From 1839 he taught at Speyer and Hadamar; in 1849 he became rector of the newly founded Maximiliansgymnasium at Munich. From 1856 to his death he was professor in the university there and director of the Royal Library. His principal works are critical or annotated editions of *Cicero* (1845–62: prominent among these is a complete text of Cicero's works, prepared in collaboration with Orelli, 1854–62), *Quintilian* (1868–69), and *Cornelius Nepos* (1871); in the Teubner series, *Æsop's Fables* (1852), *Florus* (1854), and *Tacitus* (4th ed., 1891). His shorter treatises comprise papers on the orator Lycurgus and on Æschylus; *Lectiones Stobenses* (Speyer, 1841–42); the *Catalogue of the Fathers of the Latin Church* (1865); and his rich *Catalogue of the Munich Library*, vol. i (1865). Consult Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

HALMA, ål'må', Nicolas (1755–1828). A French mathematician, born at Sedan and educated there and in Paris. He took holy orders, and was principal of the college at Sedan (1791–93). Removed from this position by the suppression of the colleges, he went to Paris and was in quick succession engineer, surgeon, professor at the Prytanée and at the Military School of Fontainebleau, librarian and instructor of the Empress, and librarian of the Department of Bridges and Highways. Then he undertook, at the instance of Delambre, the translation of Ptolemæus on astronomy, together with the commentaries of Theon on the first two books, and other material (1813–22). But the success and merits of his work were small and appointments as assistant curator of the Bibliothèque Sainte-Geneviève and as canon of Notre Dame were much more remunerative. His further works include translations and criticisms of Greek mathematicians and chronologists, and textbooks of geography, besides many miscellaneous writings.

HALMAHERA, häl'må-hä'rå. An island of the Moluccas. See Gilolo.

HAL'MOTE, or **HAL'IMOTE** (from *hall* + *mote*, AS. *gemot*, assembly). An ancient English court, held by the lord of a manor for the purpose of administering the laws and customs of the manor. It was composed of the freehold tenants of the manor, and came later to be known as the *Court Baron* or manorial court. See Court Baron.

HALMSTAD, hälm'städ. A town in Sweden, and capital of Halland Län, situated at the mouth of the Nissa on the east shore of the Cattegat, about 76 miles south-southeast of Göteborg (Map: Sweden, E 8). The town possesses a castle, now the residence of the Governor; a church dating from 1462, and a high school. It is an important railroad centre, and has regular steamship connection with most of the Swedish coast towns as well as with Copenhagen and Lübeck. It is the chief export town for a large part of Southern Sweden. The chief manufactures are cloth, beer, hats, jute, and paper. The town exports lumber, granite, fish (the river abounding in salmon), oats, butter, and woolen goods; the chief imports are foodstuffs, fertilizers, coal, petroleum, and machinery. Pop., 1901, 15,400; 1911, 18,297. Halmstad received municipal privileges in 1307, and has been the scene of many important events in the history of Sweden, among them the defeat of the Danes by Charles XI in 1676.

HA'LO (Lat. *halos*, from Gk. ἅλως, *halōs*, disk, threshing floor, from ἀλεῖν, *halein*, to grind). The general name given to a class of optical phenomena, described more specifically as Glory Corona, Anthelia, Parhelia, Mock Suns, Sun Dogs, Paraselena, Mock Moons, etc. When the light of the sun or moon or bright star shines through a delicate cloud, or layer of fog or mist, a variety of optical phenomena are produced which may be classified as (*a*) circular rings around the sun or moon or star as a centre; (*b*) horizontal rings around the zenith as a centre; (*c*) partial arcs around the sun or the zenith; (*d*) vertical columns of light either through the sun or moon, or through points around the horizon symmetrically placed with reference to the sun; (*e*) elliptical rings around the central luminary. If the observer is so located that his shadow is projected upon a cloud, a bank of fog, or a meadow covered with drops of dew, he may see similar circles of light around his shadow. The circles around the sun really occur much more frequently than those around the moon, but are less frequently observed, owing to the brightness of the sun; they can, however, easily be seen by viewing the reflection of the sky in the surface of still water or an unsilvered glass plate.

Halo is the general term by which we designate a variety of optical phenomena whose study is a branch of physical optics. The circular rings of class (*a*), when they are quite near the sun, namely, within fifteen degrees, and, in fact, usually within five degrees, are the result of the interference of waves of light that have passed around the minute globules of water, or sometimes of dust, in the hazy atmosphere. This process was called diffraction by Sir Isaac Newton, who showed that in the rear of every small object there is a bright spot instead of a shadow, and surrounding this bright spot a series of concentric rings or bands of brilliant colors. If one looks at the sun through a mass of small particles or fibres of rather uniform size, as those of wool, a similar series of concentric rings will be seen, the angular diameter of which increases as the diameters of the fibres diminish; on this principle Dr. Thomas Young based the construction of his eriometer for the determination of the diameter of small particles and the fibres of textile materials. The largest glories or coronas that have been seen about the sun are those known as Bishop's rings, observed after the eruption of Krakatoa. These are about 10, 12, or 15 degrees in radius, and must have resulted from the presence of a very delicate layer of the finest imaginable dust or aqueous globules whose diameters probably did not exceed 0.0002, or one five-thousandth of an inch. On the other hand, particles that have a diameter of 0.0013 may produce rings having a radius of one degree, which would, therefore, very closely encircle the sun or moon, whose radius is only one-quarter of one degree. All these circles are known as coronas.

For large globules of water, such as compose the lower clouds, the diffraction phenomena become inappreciable, and are replaced by more complicated phenomena of reflection and refraction. In the higher alto-stratus and alto-cumulus clouds formed of small globules of water the range of diameters is usually rather large, and a series of overlapping circles is seen when the sun or moon is behind them. In the highest cirrus clouds the particles of ice form more delicate circles. For particles of a much smaller size than those that usually occur in clouds, the phenomena of diffraction are replaced by the colors of thin plates. Brilliant illustrations of these clouds occurred in the green, blue, and red suns seen when the sun was examined through the clouds of vapor that were thrown off by the eruption of Krakatoa in 1883. The study of this subject led to the experiments by Kiessling, and more especially by Dr. Carl Barus, whose publications on cloudy condensation form the stepping-stones to our present limited knowledge of the growth of minute water globules from a diameter somewhat less than the tenth of the length of the sodium wave up to a diameter equal to that wave length itself. Consult *United States Weather Bureau, Bulletin No. 12* (1895).

In the small circles or coronas referred to, the red circles are outermost and the blue ones within; the term "halo" is applied by meteorologists more especially to circles of larger radius formed by reflection and refraction within the drops of water, such as the rainbow and the halos of 22 and 25 degrees' radius. In rainbows or halos formed by one reflection the red is innermost, namely, on the side towards the sun; and the blue is outermost, or away from the sun. Circles formed by two reflections have the red outside and the blue inside.

The complex and beautiful halo phenomena that are seen in the winter time result from the reflection and refraction of light by innumerable crystals of ice or simple snowflakes, which produce, in general, a hazy appearance in the air. When the sky is cloudless and of a pale blue near the zenith, these crystals of ice, settling down very slowly through the still air, may be sufficiently numerous to reflect enough sunlight to produce gorgeous effects. The simplest ice crystal is a regular hexagonal prism whose ends are either planes perpendicular to the axis or more commonly hexagonal pyramids. When a ray of light within a prism strikes an inner surface at an angle of incidence of about 80.5° it is totally reflected. When a beam of light passes through the two sides of a prism whose angle is 60°, in such a way as to suffer the minimum deviation, the latter will amount to about 21° 50′. Bearing these principles in mind, as also the fact that in an ordinary cloud the prisms have every possible position, we see that the general result will be that crystals that are near the position of minimum deviation will conspire to refract the light in the same direction; some of the others will send the light in any direction, so the general result will be a bright circle of light surrounding the sun as a centre; its angular radius from the sun will be about 21° 50′, or the so-called halo of 22°, which has a dark interior, an inner reddish edge, and a bright exterior.

In still air the slender prisms of ice are likely to be suspended more nearly vertically. Therefore, their surfaces reflect a little sunlight as from a vertical mirror to the eye. When the observer is in the midst of a cloud or fog of such prisms, he sees a reflection of the sunlight forming a band of white light around the horizon at the apparent angular altitude of the sun and usually passing through it. This is called the *parhelic circle.* When other combinations of reflections from snow crystals occur so as to double or treble the brightness of particular spots in this parhelic circle, these spots are called mock suns, sun dogs, or *parhelia.* A vertical arc may be produced by the reflections from the horizontal surfaces of snowflakes or more readily from the horizontal surfaces of the broad basal planes of ice crystals. This arc may extend for a very considerable distance above and below the sun and is technically known as a *light pillar.* The term *anthelion* is properly applied to a bright solar reflection located at the antisolar point on the parhelic circle. It sometimes acts as a secondary light source for secondary halos about it.

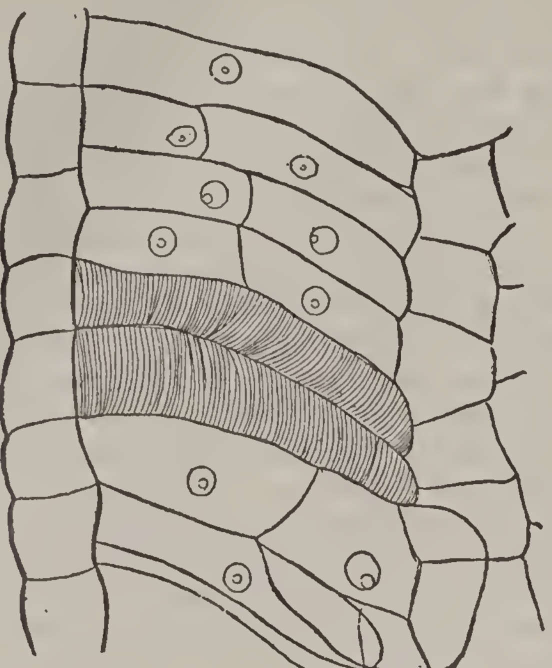
The most brilliant attendant of a halo is the tangential arc, which is sometimes seen touching the halo of 46° at its summit; it can only be seen when the sun's altitude is between 12° and 30°, and is due to the reflection of the sunlight through ice needles whose refracting edges are horizontal. The geometrical study of halos was most thoroughly worked out by Bravais, in his memoir of 1847 in the *Journal de l'Ecole Polytechnique,* vol. xviii (Paris); it is also quite fully presented by Mascart, *Traité d'optique* (Paris, 1896). The complete application of the theory of interference to the explanation of the phenomena of the supernumerary rings that accompany halos, and especially rainbows, was given by Dr. Thomas Young in 1804, but has more recently been presented in both elementary and analytical methods by Dr. J. Pernter, of Vienna. The idea that cloudy particles are not solid small spheres of water, but hollow vessels like a soap bubble, was abundantly disproved by Clausius, but still finds occasional mention in popular textbooks. However, the arguments for and against this vesicular theory (consult Kober, in Poggendorff's *Annalen,* Berlin, 1871) show that it can have no standing in science. The principal works on the theory of halos include: Bravais, "Mémoire sur les halos," in *Journal de l'Ecole Polytechnique* (Paris, 1845); Mascart, *Traité d'optique,* vol. iii (ib., 1896); Pernter and Exner, *Meteorologische Optik* (Vienna, 1902–10); Besson, "Sur la théorie des halos," in *Annales de l'Observatoire de Montsouris* (Paris, 1908–09). See also the *Monthly Weather Review* (Washington, 1914) for descriptions of elaborate halos seen in the United States in November, 1913, and for guides to the observation of halos.

HALOANDER, hä′lô-än′dẽr, GREGORIUS (1501–31). A German jurist whose family name was Meltzer. He was born at Zwickau and was educated in Leipzig. He published, at Nuremberg, under the protection and with the help of Wilibald Pirkheimer, the *Pandectæ* (1529); *Institutiones* (1529); *Codex Justinianeus* (1530); and, in Greek with a Latin version, *Novellæ Constitutiones* (1531). He also edited Epictetus' *Enchiridion* (1529). Consult Schmidt, *Symbolæ ad Vitam Gregorii Haloandri* (Leipzig, 1866), and Flechseg, *Gregor Haloander* (Zwickau, 1872).

HAL′OGENS (from Gk. *ἅλς, hals,* salt + *-γενης, -genēs,* producing, from *γίγνεσθαι, gignesthai,* to be born). The name given to the four nonmetallic elements, fluorine, chlorine, bromine, and iodine. The term was originally used by Berzelius, on account of the ease with which these elements form salts. The halogens combine directly with many of the other elements, much heat being evolved in the process. With hydrogen, they form the well-known hydrofluoric, hydrochloric, hydrobromic, and hydroiodic acids, respectively. The halogens exhibit an unmistakable gradation of physical properties. Thus, fluorine is a colorless gas; chlorine is a yellowish-green gas easily condensed to a liquid; bromine is a dark-red volatile liquid; iodine is a lustrous grayish-violet solid. See FLUORINE; BROMINE; CHLORINE; IODINE; PERIODIC LAW.

HALOPH′ILOUS PLANT (from Gk. *ἅλς, hals,* salt + *φίλος, philos,* loving). See HALOPHYTE.

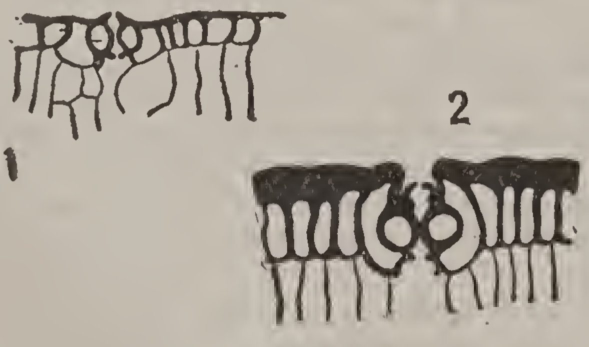
HAL'OPHYTE (from Gk. ἅλς, *hals*, salt + *φυτόν*, *phyton*, plant). Plants which grow naturally in soils or waters rich in various salts, especially those with alkaline reactions. Common salt is quantitatively much the most important of these substances, although in certain localities alum, saltpetre, and other salts are abundant enough to be of ecological importance. The vegetation of the oceans and salt seas and lakes, as well as that along their marshy shores, represents the greater part of the halophytic vegetation of the world; however, there are great interior halophytic areas in arid climates, where seas or salt lakes have formerly existed. Sometimes salt springs or small areas of salty soil disclose a halophytic vegetation. While a great many species have, perhaps, become perfectly adjusted to soils or waters rich in salt, it is nevertheless true that these conditions are unfavorable for the development of the great majority of plants; and experiments have shown that many halophytes may grow as well, if not better, in soils or waters with a low salt content. This is not true, however, in the case of such extreme halophytes as the marine algæ.



HALOPHYTES.

Longitudinal section of the stem of samphire, showing obliquely arranged palisade cells, also isolated water tracheids.

Effects of Salt on the Growth and Structure. Almost all plants can take up limited quantities of ordinary salt without injury, although most plants probably do not need it in their normal life processes. All but natural halophytes and a few xerophytes soon perish if large quantities of salt are present in the soil. Probably the injurious effects of salt are due to the increased difficulty of osmotic absorption by the root, and to the inhibiting action of salt on the plant's normal life processes. Structures and conditions that have been experimentally shown to result from growth in salt solutions are reduction in leaf surface, increase of leaf thickness (due to richer development of palisades and water-storage cells), and reduction of intercellular spaces. All of these are well-known xerophytic characters, so that halophytes, with the exception of submerged marine plants, are now regarded as a class of xerophytes, whether the soil in which they grow be dry or wet. The structures noted, as well as others, doubtless serve to reduce transpiration, and it may be supposed that this is an advantage, because of the lessened osmotic absorption. See XEROPHYTES.



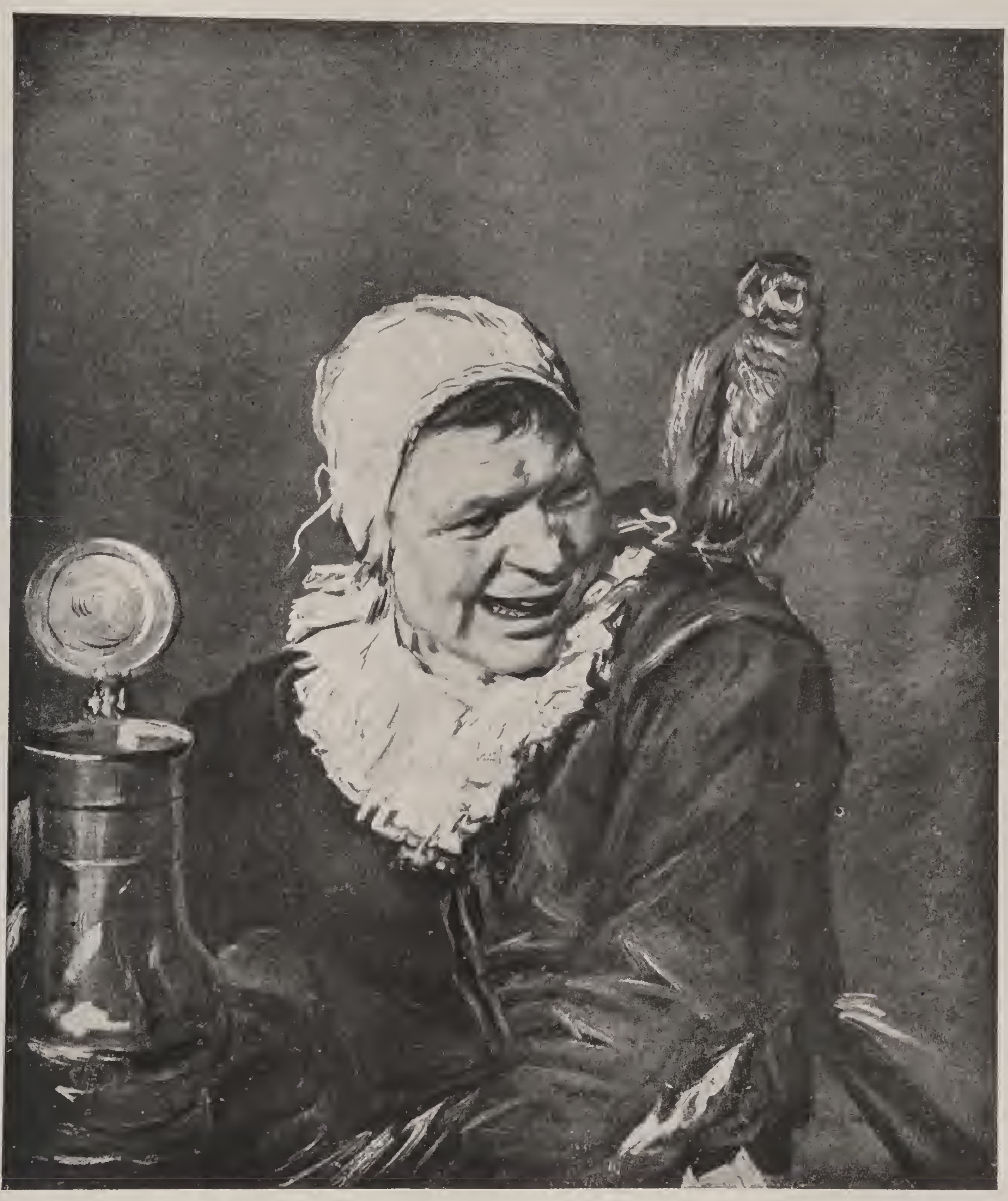
HALOPHYTES.

Cross section of leaf of *Sonneratia acida:* 1, in ordinary soil condition; 2, when grown in salty soil, showing the great thickening of the cuticle in the latter.

Halophytes belong to a great number of families, some of which, as the Chenopodiaceæ, Frankeniaceæ, Plumbaginaceæ, are particularly rich in halophytic members. One of the most interesting features of halophytes is the wide distribution of their species. It is easy to see how coastal forms should be similar over wide areas, but why the same forms should also occur in many continental interiors is not so apparent. Perhaps the former interior seas had marine connections; in this case the interior halophytes form the best-known group of relict plants (q.v.). It must be remembered, however, that migrations are easier than has been generally supposed, and that, given a congenial habitat in a congenial climate, a species or genus characteristic of such places is pretty likely to appear sooner or later. The various halophytic formations and associations are treated under BEACH PLANTS; BENTHOS; DESERT VEGETATION; DUNE VEGETATION; MANGROVE SWAMP; PLANKTON; SWAMP.

HAL'PINE, or **HALPIN**, CHARLES GRAHAM (1829–68). An American soldier and poet, born in Oldcastle, County Meath, Ireland, and educated at Trinity College, Dublin. After a short journalistic experience in Dublin, he went to America in 1851. For a few months he was the associate editor of the Boston *Post*, served as the Washington correspondent of the New York *Times*, and, after short connections with various metropolitan papers, was associate editor of the New York *Times* until 1857, when he became editor in chief of the New York *Leader*. At the outbreak of the Civil War he enlisted in the Sixty-ninth Regiment, New York Volunteers. He served as assistant adjutant general on General Hunter's staff and under General Halleck, accompanied the former on his Shenandoah expedition in 1864, resigned from the service soon afterward on account of failing health, and was brevetted a brigadier general of volunteers. His experiences and observations as a soldier found humorous expression in the popular poems and stories written over the pen name of Miles O'Reilly. He became editor of the New York *Citizen* in 1864 and strongly advocated civil-service reform, was elected register of New York County in 1867, and died in the following year from his continued literary exertions. His best-known writings, apart from fugitive poems, are: *Lyrics by the Letter H* (1854); *Life and Adventures, Songs, Services, and Speeches of Private Miles O'Reilly* (1864); *Baked Meats of the Funeral: A Collection of Essays, Poems, Speeches and Banquets of Private Miles O'Reilly* (1866). His collected *Poetical Works* appeared in 1869, edited with a biographical sketch, and explanatory notes by R. B. Roosevelt.

HALS, häls, FRANS (c.1580–1666). A Dutch



FRANS HALS

"HILLE BOBBE" FROM THE PAINTING IN THE NATIONAL GALLERY, BERLIN

portrait and genre painter, one of the greatest painters of all times. He was born at Malines, in the Province of Antwerp, the son of a Protestant cloth worker. For religious reasons his father emigrated to Haarlem before 1591, in which year his son Dirk was born. Although Frans studied with Karel van Mander, no trace of this master's influence appears in his earliest surviving picture, which dates from his thirty-sixth year. With the exception of a visit to execute commissions at Amsterdam, he spent his entire life at Haarlem, where he was twice married and reared a large family. He lived in modest circumstances and in late life was very poor. In 1652 his furniture and pictures were distrained to pay a baker; he was subsequently assisted with grants from the city poor fund; and in 1664 the municipality of Haarlem allowed him a yearly pension of 200 florins, which he enjoyed until his death, on Sept. 7, 1666. His first marriage was unhappy, so much so that he was reprimanded by the magistrates for beating his wife. His marriage to Lysbeth Reynier was more congenial; at least there are no complaints about his conduct. His jovial disposition and love for the tavern still live in story, and it is certain that he was held in high esteem by his fellow townsmen. No other painter of Holland received so many commissions from the guilds and other public corporations, or retained the favor of his contemporaries for half a century. Like his brother, Dirck, he was an honorary member of the chamber of rhetoric; he belonged to the civic guard, and was head of the painters' guild and of an important school of painting.

The artistic development of Hals may best be studied in his large *doelenstukken* (portrait groups of the military guilds and other corporations) worthily preserved in the new Frans Hals Municipal Gallery (1913) at Haarlem—for Hals was, above all others, the painter of militant Holland and was himself one of the guild men who fought against Spain. The earliest of these groups, the "Banquet of the Officers of St. George's Shooting Company" (1616), is in his first manner. There are traces of the old Haarlem school, but Hals is already an independent master. His grouping is freer; his color, though still brown in tone, is more luminous and applied in a broader manner; and the characterization is far superior.

His second manner (1627–39) is represented by four fine groups in the Haarlem Gallery: the "Banquet of the Officers of St. George's Shooting Company" (1627); "Banquet of the Officers of the Arquebusiers' Shooting Company" and "Assembling of the Officers of the Arquebusiers' Shooting Company," the most serious and finest of the groups; and the "Officers and Sergeants of St. George's Shooting Company," 19 figures, among which is that of the artist himself. To these might be added a similar piece, "The Company of Capt. Reynier Reael" (1637), Rijks-Museum, Amsterdam, begun by Hals, but completed by Pieter Codde. During this period his pictures are characterized by a light-gray tone, greater breadth of execution, and greater seriousness of character. Another portrait group of the Haarlem Museum, the "Governors of the Elizabeth Hospital" (1641), in the peculiar treatment of light and in its rich golden hue, shows the influence of Rembrandt—an influence, however, which was only temporary and experimental. Before 1635 his color began to grow deeper, and a darker-gray tone pervades his pictures. His treatment attained a breadth perhaps never achieved by another of the old masters. This last manner is represented in the Haarlem Museum by two fine portrait groups: "Governors of the Hospital for Old Men" and the "Lady Governors of the Hospital for Old Women," both of 1665. Frans Hals makes all details subordinate to the character and expression of the face, thereby emphasizing the masterly execution. "Never was there better painting; never will there be any better painting." He left more than 160 works, most numerous in Dutch and German galleries and in those of Paris, St. Petersburg, and New York. His sitters included members of the most distinguished families of Holland, its greatest divines, both Protestant and Catholic, its renowned statesmen and military commanders, and scholars, besides numerous painters and a host of burghers.

Among the most interesting examples of portraits of the first period are the wrongly called "Artist and his Wife in a Park" (1624), at Amsterdam; the irresistible "Laughing Cavalier," Wallace collection, London; an unknown "Nobleman and his Wife," at Cassel; "Jacob Olycan and his Wife" (1625), in The Hague; and a "Young Married Couple" (1627), in Berlin. The Louvre possesses three fine examples of his second manner: "Nicholas Berensteyn" (1629), "Vrouw Berensteyn" and the "Berensteyn Family," an admirable group composed of father, mother, six children, and two nurses; and a "Girl of the Berensteyn Family," one of the most charming of Hals's feminine portraits. Other prominent examples are the "Nurse with Child" (1630), Berlin Museum; the life-size figure of William van Heythuysen, Liechtenstein collection, Vienna—his masterpiece, according to Bode; an "Unknown Man," Buckingham Palace, London; "Nicolas van der Meer" (1631) and "Vrouw van der Meer," in Haarlem Museum; the supposed "Admiral de Ruyter," Spencer collection, Althorp (England).

The portraits of his last period show no decline. Among the best are those of Heer Bodolphe and Vrouw Bodolphe (1643), J. P. Morgan collection, Metropolitan Museum, New York; four well-known portraits of unknown men, in the Hermitage at St. Petersburg; especially the so-called "Admiral," and "Tyman Oosdorp" (1656), Berlin. Mention should also be made of Hals's portraits of himself, of which the two best, painted 1635 and c.1650, are in possession respectively of Henry C. Frick, New York, and Jules Porges, Paris.

Hals may be called the father of Dutch genre painting, in which he found an amusement and freedom not possible in ordered portraits. His subjects were usually taken from the humbler walks of life—fisher boys and girls, market women, wandering musicians, and especially his own children, whom he never tired of painting. Most were painted between 1620 and 1640, with broader humor and bolder execution than his portraits. Among the best are: the "Jolly Trio" (1615), Altman collection, Metropolitan Museum, New York; the so-called "Herring Vender" (1616), Earl of Northbrook's collection, London; "Junker Ramp and his Mistress," Altman collection. To the same period belong a number of pictures of singing boys and flute players in the galleries of Brussels, Berlin, Königsberg, Schwerin, etc., for which his children often posed as models; and of jovial drinkers at Amsterdam, Cassel, etc. Especially fine examples of this genre are the "Fool Playing a Lute," Baron Gustave de Rothschild, Paris, the better-known copy being at Amsterdam, and "La bohémienne," in the Louvre. "Hille Bobbe," an old woman with an owl upon her shoulder and a tankard of wine in her hand, is in the Berlin Museum (replica in the Metropolitan Museum, New York).

Hals is especially well represented in American collections. At the Hudson-Fulton Memorial Exhibit, in 1909, the 20 examples displayed were by no means all in the United States. The Metropolitan Museum of Art, New York, has, including the Morgan and Altman pictures, nine examples, among which are portraits of an "Unknown Man" and an "Unknown Woman" in Hals's very best style. He is represented also in the Boston Museum, the Art Institute of Chicago (two), and in many private collections—thus, in the Frick (two), Havemeyer (two), J. P. Morgan (two), besides others mentioned above; and Huntingdon (three), Borden, Jesup, and Schwab collections, New York; in the Johnson (two) and Widener collections, Philadelphia (the last named having six fine examples).

Frans Hals is the first great painter of the Dutch national school and ranks with Rembrandt as one of its greatest geniuses. Compared with Rembrandt, he is lacking in sentiment and imagination; but as a painter pure and simple, he has never been surpassed. His brushwork is brilliant and sure, and he excels particularly in the juxtaposition of colors and their subordination to a prevailing tone and the rendition of their values. He paints without artifice in simple diffused light. The most striking expressional quality of his pictures is their inimitable humor, of which he depicted every phase —from a thoughtful, kindly smile to uproarious laughter.

Sons and Pupils. Hals's influence on Dutch painting was no less profound than that of Rembrandt, affecting the entire Haarlem school of the seventeenth century. At least seven of his sons were painters, and his daughters married into the profession. JAN, HARMAN (1611–69), and REYNIER (1630–after 1671) are represented by signed pictures, but the most important is FRANS HALS THE YOUNGER (c.1620–69). Many still-life and stable interiors, as well as landscape drawings with figures and cattle, bear his signature. They are in the manner of the early Rotterdam painters of similar subjects and do not resemble his father's work. The "Armorer," in St. Petersburg, perhaps best represents his style. The attribution of weak copies of his father's works to him is purely arbitrary. The principal pupils of the elder Frans Hals were: Adriaen Brouwer, Adriaen and Isaac van Ostade (painters of peasant life), Philip Wouwermann (qq.v.); Jan Molenaer, his wife Judith Leyster, and Jan de Bray. But many others felt his influence.

Bibliography. The first critical authority on Frans Hals in the modern sense was Bode, *Studien zur Geschichte der holländischen Malerei* (Brunswick, 1883). The best modern biography is by Moes (Fr. trans., Brussels, 1909); others are by Davies, the principal British authority (London, 1902); and Peladan (Paris, 1912), with admirable illustrations, but unscholarly text. A complete list of his works is by De Groot, *Catalogue of Dutch Painters,* vol. iii (Eng. trans., London, 1911), with good brief biography. For reproductions of all his paintings, with a brief bibliography, consult the folio monograph by Bode (Berlin, 1914).

HALSBURY, hąlz′bĕr-ĭ, HARDINGE STANLEY GIFFARD, first EARL OF (1825–). A British Lord Chancellor, born in London and educated at Merton College, Oxford. He became a barrister of the Inner Temple in 1850, queen's counsel in 1865, treasurer of the Inner Temple in 1881, and participated in many of the famous criminal cases of his time. In 1875 he was knighted; from 1875 to 1880 he was Solicitor-General; and he was a member of Parliament from 1877 to 1885, when he became Lord Chancellor, with the title of Baron Halsbury. He continued in office until 1905, except during the Liberal ministries of 1886 and 1892–95. In 1898 he was created Earl of Halsbury and Viscount Tiverton.

HÄLSCHNER, hĕlsh′nĕr, HUGO PHILIPP EGMONT (1817–89). A German criminologist. He was born at Hirschberg, Silesia, was educated at Breslau and Berlin, and in 1850 was made professor ordinarius of law at Bonn, where he lectured on the history and nature of criminal law. In 1868 he was made a life member of the Prussian Upper House. His principal publications are: *System des preussischen Strafrechts* (2 parts, 1858 and 1868); *Das Recht Deutschlands im Streit mit Dänemark* (3d ed., 1863), an important work in which the disputes between Germany and Denmark are treated from the standpoint of the legal historian.

HAL′STEAD, MURAT (1829–1908). An American journalist, born in Ross Township, Butler Co., Ohio. He was educated at Farmers' College, near Cincinnati, became a member of the staff of the Cincinnati *Commercial* in 1853, and in 1865 its chief owner. This journal was subsequently consolidated with the *Gazette* of Cincinnati, as the *Commercial-Gazette,* of which he became the editor in chief. He was afterward editor of the Brooklyn *Standard-Union* and then became a special newspaper correspondent and magazine writer, in which capacity he visited the Philippine Islands during the Spanish-American War. His works include: *The Story of the Philippines* (1898); *Life and Achievements of Admiral Dewey* (1899); *Full Official History of the War with Spain* (1899); *Aguinaldo and his Captor* (1901); *The Illustrious Life of William McKinley* (1901); *The Life of Theodore Roosevelt* (1902); *The War between Russia and Japan* (1904).

HAL′STED, BYRON DAVID (1852–). An American botanist, born at Venice, N. Y. He was educated at the Michigan Agricultural College (B.S., 1871) and, after two years' teaching in that institution, at Harvard (Sc.D., 1878). In 1879 he became editor of the *American Agriculturist.* He was elected professor of botany at Iowa Agricultural College (1885) and at Rutgers College (1889). He was associate editor of the *Bulletin of the Torrey Botanical Club* in 1890–93 and of *Systematic Flora* after 1905. He served as president of the Society for the Promotion of Agricultural Science in 1897–99, and of the Botanical Society of America in 1900–01. Halsted gained most reputation by his knowledge of weeds and fungi injurious to agriculture. He wrote: *The Vegetable Garden* (1882); *Household Conveniences* (1883); *Farm Conveniences* (1888); *A Century of Agricultural Weeds* (1891).

HALSTED, George Bruce (1853–). An American mathematician and educator, born at Newark, N. J. He graduated at Princeton in 1875 and studied at Johns Hopkins and in Berlin. He was an instructor in postgraduate mathematics at Princeton (1878–81) and professor of mathematics at the University of Texas (1884–1903), St. John's College, Maryland (1903), Kenyon College, Ohio (1903–06), and after 1906 at the Colorado State Teachers College. He was awarded a fellowship by the Royal Astronomical Society, London. Halsted devoted himself to the dissemination of a knowledge of non-Euclidean geometry and to this end published translations of Bolyai and Lobachevsky. He wrote on mathematics, philosophy, and formal logic for a number of scientific magazines, was a collaborator in preparing *The Century Dictionary and Cyclopedia,* and published: *Mensuration* (1881); *Elements of Geometry* (1885); *Elementary Synthetic Geometry* (1892); *Pure Projective Geometry* (1895); *Non-Euclidean Geometry* (1900); *Rational Geometry* (1904); *On the Foundation and Technic of Arithmetic* (1911); and 90 books and memoirs cited in *Bibliography of Non-Euclidean Geometry,* by D. M. Y. Sommerville (London, 1911).

HALSTED, William Stewart (1852–). An American surgeon. He was born in New York City and graduated from Yale University in 1874 and from the College of Physicians and Surgeons (Columbia) in 1877. He was attending physician at the Charity Hospital (New York) in 1881–83, attending surgeon at Bellevue and Presbyterian hospitals in 1885–87, surgeon in chief at the Emigrant Hospital (New York) in 1881–84, and associate surgeon and surgeon in chief of the Out-Patient Department of Roosevelt Hospital in 1881–87. In 1889 he became professor of surgery at Johns Hopkins University and surgeon in chief of Johns Hopkins Hospital. His publications consist of papers on pathology, physiology, and surgery.

HALYARDS. See Halliards.

HALYS, hā'lĭs. The old name of the Kizil Irmak (q.v.), the largest river in Asia Minor.

HALYSITES, hăl'ĭ-sī'tēz (from Gk. *ἅλυσις, halysis,* chain). A fossil coral found in rocks of Ordovician and Silurian age in North America, Europe, and Australia, and distinguished by the chainlike figure produced by a cross section of its mass upon the surface of a rock in which it is embedded. *Halysites* is a very characteristic fossil of the Niagara series, and two species, viz., *Halysites catenularius* and *Halysites escharoides,* are common in the Silurian coral reefs of North America and England, where they are known as chain corals.

HAM, äN. A town and fortress in the Department of Somme, France, on the Somme, 36 miles by rail from Amiens and 70 miles north-northeast of Paris. It is situated in the midst of a low and swampy country. Its celebrated mediæval castle, strengthened by modern additions, has frequently served as a prison for political offenders, including Louis Napoleon, afterward emperor, who was held here from 1840 to 1846. After the coup d'état of Dec. 2, 1851, the Republican generals Cavaignac, Lamoricière, Changarnier, and others were imprisoned in the castle for some time. The donjon, a round tower, is 110 feet high, 110 feet broad, and has walls 36 feet thick. Other noteworthy features of the town are the twelfth-century Romanesque church of Notre Dame, recently restored, a belfry, public library, and museum. Its industries are peat cutting and the making of sugar, brandy, and oil. Pop., 1901, 3300; 1911, 3161.

HAM (AS. *hamm,* OHG. *hamma,* dialectic Ger. *Hamme,* ham, haunch; connected with Gael. *cam,* Lat. *camur,* crooked). Properly the hind part or angle of the knee, but usually applied to the cured thigh of the ox, sheep, or hog, more especially the last. Ham curing and bacon curing are performed in a variety of methods, each country or district having its own peculiar treatment. The essential operations are salting and smoking. The curing of pork hams forms a large and important item in the industry of various countries. See Food; Packing Industry.

HAM. According to Gen. x, 6–20, the second son of Noah, and ancestor of a group of people which includes Cush (Ethiopia), Mizraim (Egypt), Put (Libya), and Canaan. In Gen. ix. 26, 27, the three sons of Noah were Shem, Canaan, and Japheth, representing three groups settled in Palestine. When this song was composed, Shem was probably the name of a congeries of tribes, conscious of a closer kinship, including, besides Israel, many of the tribes of Judah, the Negeb, Edom, and the East Jordan country. Japheth was probably a similar name, including some tribes, like the Cretans, the Pelethites, the Zakkalians, and the Philistines. Canaan was also the name of several tribes. Subsequently the names of two of the brothers acquired a wider meaning, so that Shem came to include Arabs, Aramæans, Assyrians, Arrapachæans, and also Elamites (because of the long Semitic occupation of Elam and considerable Semitic population there), and Lydians (because of the early Assyrian occupation of a part of Asia Minor). Japheth was made to include a number of nations in Asia Minor and the islands and western coast lands of the Mediterranean, as different as Cypriotes, Medes, Greeks, and Scythians. The name of Canaan was too closely attached to the land of Canaan to allow a similar expansion, and Ham was used to designate the larger family made up of Egyptians, Libyans, Ethiopians, and Canaanites. The most probable theory is still that Ham is connected with the name *Chem* for Egypt. There is every reason to believe that all of these peoples belonged originally to the same branch of the Mediterranean race. On the relation of the Canaanites to the others, see Canaan. Consult the commentaries on Genesis by Holzinger, Strack, Dillmann, Delitzsch, Ball, Skinner, Driver, Gunkel; also Knobel, *Die Völkertafel der Genesis* (Giessen, 1850); Schmidt, *The Messages of the Poets* (New York, 1911).

HAM, East and West. Two English municipalities, east suburbs of London, from which they are separated by the river Lea (Map: London. D 8 and 9). Their growth and importance are due to their proximity to the metropolis, and to the numerous factories established in their midst to evade the prohibitive enactments of the London County Council. Both city administrations are of a high order. West Ham owns a fine town hall, municipal buildings, a public hall, free libraries, a well-equipped technical institute, an electric-lighting plant, electric tramways, isolation hospitals, a lunatic asylum, public baths, and recreation grounds. East Ham is well provided with libraries, parks, and recreation grounds, electric lighting, and tramways, a new town hall, technical institute, and public baths. Pop., East Ham, 1901, 96,000; 1911, 133,504; West Ham, 1901, 267,300; 1911, 289,102.

HAMA, hä-mä′ (the *Hamath* of the Bible). A city of Syria, situated on both banks of the Orontes, about 120 miles by rail north of Damascus (Map: Turkey in Asia, C 3). It is irregularly laid out with narrow, crooked, ill-paved streets, and houses built mostly of mud. It has 13 mosques, a castle of the emirs of the Kilani family, and well-stocked bazars. Its manufactures consist chiefly of rough woolen mantles, cotton fabrics, and leather goods; trade is with the neighboring Bedouins. Pop. (est.), 45,000. See HAMATH.

HAMADAN, hä′ma-dän′. A town of northwest Persia, capital of a province of the same name, situated in a very fertile and picturesque region, about 180 miles southwest of Teheran (Map: Persia, C 5). It is unattractive, but has a number of well-stocked bazars, several mosques, and two tombs of special interest—one claimed to be that of Mordecai and Esther, and the other of the Arabian philosopher Avicenna (q.v.). It has a unique system of separating different parts of the town by gates in times of disorder. Hamadan is famous for its copper ware, leather trunks and saddlery, harness, felt, carpet, silver, and gold works. Commercially the town is of considerable importance, owing to its position on the route between Bagdad and Teheran. The population is estimated at 40,000, including about 1000 Jewish families. Hamadan is generally believed to occupy the site of the ancient Ecbatana (q.v.).

HAMADHAN I, ABU'L FADL AHMED IBN AL HUSAIN AL (967–1007). A Moslem poet. He was born in Hamadan, lived in Jurjan two years and later in Nishapur, Ghazna, and Herat, where he died. His extensive knowledge of poetic productions and the beauty of his style earned for him the title *Bedi' al zaman*, "the wonder of the age." He developed the new species of poetry called the *makamat*, a kind of rhymed prose in a highly finished and ornamental style. The makamat often took the form of a dialogue. In this branch he was excelled only by Hariri, of Baśra, a century later. He also developed the epistolary style which reached its perfection in the works of Abu'l Ala al Maarri. His *Rasa'il*, or Letters, were published at Constantinople in 1881, with the commentary of Ibrahim al Ahdab at Beirut in 1890; his makamat were published at Constantinople, 1881, with the commentary of Mohammed Abdo at Beirut, 1889; the latter had already been edited by Scheidius in 1572 under the title *Consessus Hamadanensis vulgo dicti Bedialzaman*, and six of them by De Sacy in his *Chrestomathie Arabe* (2d ed., Paris, 1827). Consult Kremer, *Culturgeschichte des Orients* (Vienna, 1877); Brockelmann, *Geschichte der arabischen Literatur, I* (Weimar, 1898); Nicholson, *A Literary History of the Arabs* (London, 1907).

HAM′ADRY′AD (Lat. *hamadryas*, from Gk. ἁμαδρυάς, *hamadryas*, from ἅμα, *hama*, with + δρῦς, *drys*, tree). A venomous serpent, the largest of Oriental cobras (*Naja* or *Ophiophagus bungarus*). It is nowhere numerous, but widely distributed, occurring in damp, forested regions from Ceylon to the Philippines, and is known as the giant, or king, cobra, and in some parts of India as sunerkor. It grows to a length of 12 feet and probably more, and has a hood which it can expand; but differs from the common cobra in having no spectacled markings, by the presence of a pair of large shields on the head behind the parietals. It is variable in color, but usually, when adult, is some shade of brown, with broad dark crossbands. It is fierce in disposition, rarely showing any fear of man (though exhibiting much intelligence in captivity), and often climbs trees and conceals itself in their hollows. It is almost the only snake which will attack a man without provocation. It feeds altogether upon snakes, which it chases swiftly, seizes behind the head, and swallows headforemost. It is said that a man bitten by a vigorous snake of this species will die in three minutes, and an elephant in two hours. Were it not so rare it would be the most dangerous reptile in the world. See COBRA; KRAIT. Consult Ditmars, *Reptiles of the World* (New York, 1910).

HAMADRYAD. The mandrill. See BABOON.

HAMADRYADS. See NYMPH; DRYADS.

HAM′AME′LIS. See WITCH HAZEL.

HA′MAN. A character introduced into the Book of Esther as an "Agagite" (Amalekite), chief minister of Ahasuerus, King of Persia. When Mordecai the Jew refused to obey the order to bow down before Haman, the latter made an attempt to destroy all the Jews in the kingdom; Queen Esther, however, foiled his design, and Haman was hanged on the very gibbet which he had prepared for Mordecai. See ESTHER, BOOK OF.

HAMANN, hä′män, JOHANN GEORG (1730–88). A German writer and a very original thinker, sometimes called the "Magician of the North." He was born at Königsberg in Prussia. His early life was somewhat checkered, and he frequently changed his dwelling place. In 1759 he returned to his home in Königsberg and devoted himself to the study of the ancient languages and Oriental literature. As an author, Hamann was little esteemed by his contemporaries. His language was figurative and symbolical in the highest degree and frequently concealed rather than revealed the depth of his thinking. Yet he had the friendship of many eminent authors, and the influence which he exercised upon Herder, Goethe, and Jacobi was considerable. All his writings exhibit a deeply spiritual faith, which took the form of extreme pietism. Among them the *Sokratische Denkwürdigkeiten* (1759) and *Kreuzzüge des Philologen* (1762) are perhaps less oracular than the rest. His complete works were published by Roth (Berlin, 1821–43), in seven volumes; an eighth volume by Wiener (Berlin, 1843) contains additions and explanations and an indispensable index. His correspondence with Jacobi was published by Gildemeister (Gotha, 1868), who also wrote his biography (4 vols., 1857–63). For his life, consult Poel (Hamburg, 1874–76); for his literary influence, Minor (Frankfort, 1881).

HAMANN, OTTO (1857–). A German zoölogist. He was born in Leipzig and studied at Jena, at Naples, and at Göttingen, where he was first assistant in the zoölogical institute. In 1892 he became a librarian in the Berlin Royal Library. His major published works deal with his zoölogical studies of the lower forms of life and with some of the broad general questions of the science: *Beiträge zur Histologie der Echinodermen* (1884–89); *Entwicklungslehre und Darwinismus* (1892); *Die Nemathelminthen* (1891–95); *Haeckel und seine Kampfesweise* (1893); *Europäische Hohlenfauna* (1896); *Ab-*

stammung der Menschen (2d ed., 1910); *Natur und Bibel* (2d ed., 1911).

HAMASA, or **HAMASAH,** hȧ-mä′sȧ (Ar. *hamāsah*, bravery, from *hamisa*, to be firm). The name of a famous anthology of Arabic poetry, collected by Habib ibn Aus al Tai, surnamed Abu Tammam (c.807–846), and divided by him into 10 books. The first book is the longest and deals with the heroes of pre-Islamic times, illustrating the quality of hamasah (valor), which names the book, and also the whole collection. The remaining books deal with (2) Lamentations; (3) Manners; (4) Love; (5) Satires; (6) Hospitality; (7) Descriptions; (8) Travel; (9) Pleasantries; (10) Blame of Women. The collection is made with singularly good taste, and is taken from ordinary works rather than from the standard poets. It is of great historical value, since it pictures very faithfully the life and the characteristics of the early Islamic era. There are three editions of the Arabic: (1) by Freytag (2 vols., Bonn, 1828–47); (2) the Bulak edition (A. H. 1256); (3) the Calcutta edition (1856). The Hamasah has been translated into German by Friedrich Rückert (Stuttgart, 1846), and selections have been rendered into English by Lyall, *Ancient Arabic Poetry* (London, 1885). See ABU TAMMAM.

HAMATH, hȧ′mȧth. A city in northern Syria, situated on the banks of the Orontes (the modern el-Asi). The name signifies "fortress" or "sacred inclosure"; by the Greeks the city was called Epiphania, probably in honor of Antiochus IV Epiphanes; by the Christians, Emath Epiphania; but the old name still maintains itself as Hama. Hamath is mentioned as early as the inscriptions of Thothmes III (1501–1447 B.C.) and Seti I (1319–1310 B.C.). It seems to have been an ancient stronghold of the Hittites. King Toi of Hamath sent to David a message of congratulation upon his victory over Rehob (after 1026 B.C.; 2 Sam. viii. 9). Hamath was evidently the capital of a state within whose boundaries were other towns, like Karkar, Riblah (2 Kings xxiii. 33), and Libo (Judg. iii. 3, Gk. version; Antonine Itinerary, 198.3; the modern Lebweh, as Olmstead has shown). It is doubtful whether Solomon exercised any authority north of this point. Irchuleni of Hamath was one of the allied kings against whom Shalmanezer III fought at Karkar in 854 B.C. One of his successors was Zakir, King of Hamath and La'ash, who conquered Bar Hadad II of Damascus c.800 B.C., according to the inscription found by Pognon in 1903 and published by him in 1907. In 2 Kings xiv. 28, the text is too corrupt to permit any conclusion as to the author's thought, and the passage cannot be used to prove a conquest of Hamath by Jeroboam II of Israel. Ini-ilu of Hamath paid tribute to Tiglath-pileser IV in 730 B.C., who annexed 19 districts of the land to Assyria. Sargon conquered Hamath in 720 B.C. and flayed King Yaubidi alive. According to 2 Kings xvii. 24–30, Hamathites were transported to Samaria, where they introduced the worship of the goddess Ashima. Hamath belonged successively to the Assyrian, the Chaldean, the Persian, and the Seleucid kingdoms. In the Hasmonean period Jonathan, the Judæan high priest, marched with an army into the country of Hamath for the defense of Demetrius. Hamath submitted peaceably to Abu Ubaida, the Moslem leader, in 639, and the Christian church was changed into a mosque. In the period of the Crusades the Ismailians took possession of Hamath. Tancred conquered the city in 1108 and massacred the Ismailians; but the Christians lost it to the Turk Togtekin in 1115. In 1178 the city passed into the hands of Saladin. A flourishing period for Hamath was the reign of Abulfida (1310–31). (See ABULFIDA.) In 1812 Burckhardt visited the city and saw the famous stones covered with Hittite inscriptions, which have not yet been deciphered. (See HITTITES.) For the modern town, which has a population of about 45,000, see HAMA. Consult: Burckhardt, *Travels in Syria and the Holy Land* (London, 1822); Delitzsch, *Wo lag das Paradies?* (Leipzig, 1881); Winckler, *Alttestamentliche Untersuchungen* (ib., 1892); Olmstead, *Western Asia in the Days of Sargon of Assyria* (New York, 1907); Pognon, *Inscriptions Sémitiques* (Paris, 1907); Benzinger, in Baedeker's *Palestine and Syria* (Leipzig, 1912); Ed. Meyer, *Geschichte des Altertums* (3d ed., Stuttgart, 1913).

HAMBACH, häm′bȧG. A village of the Bavarian Palatinate situated on the Hardt, 15 miles west of Speyer. Its chief industry is the production of wine. Pop., 1900, 2244; 1910, 2273. The ruins of Hambacher Castle are famous chiefly on account of the Hambacher Fest, a revolutionary meeting which took place here on May 27, 1832, attended by about 30,000 persons. This gathering marked the beginning of an open republican movement and was followed by a series of reactionary measures by the Bavarian government. Most of the leaders of the gathering were compelled to seek safety abroad and some were imprisoned.

HAM BEETLE. A cosmopolitan beetle (*Necrobia rufipes*) of the family Cleridæ, also called "red-legged ham beetle," which is particularly abundant in the southern and western United States and occasionally ruins many hams in the packing houses and storehouses. The injury is generally due to careless packing or to the accidental cutting or cracking, or even to a considerable stretching or fraying, of the canvas covering of the hams. It is a small, rather slender beetle of dark-bluish color, with reddish legs. Its larva is a slender grub, white at first, with a dark head and two small hooks at the end of the body. When full-grown, it is grayish white with a series of brown patches above. It transforms to pupa within a paper-like cocoon. There are several generations each year, and the winter is passed both in the larval stage and as an adult.

HAM′BLET, PRINCE OF DENMARKE, HYSTORIE OF. The probable source of Shakespeare's *Hamlet*, an English translation of one of Belleforest's *Histoires tragiques*, which in their turn were copied from Bandello's tales. The French version was published in 1570 and was at once extremely popular in England; the translation was made before 1596, possibly by 1589. See AMLETH.

HAM′BLIN, JOSEPH ELDRIDGE (1828–70). An American soldier of the Civil War, born at Yarmouth, Mass. Long a member of the Seventh Regiment of the New York militia, he enlisted in 1861 as adjutant in Duryea's Zouaves and served in Virginia under Butler, McClellan, Meade, Grant, and Sheridan in the Sixty-fifth New York. He especially distinguished himself at Cedar Creek, where he was wounded. He was brevetted brigadier general and in 1865 promoted to full rank, with the brevet of major general, for his gallantry at Sailor's Creek. After the war he was prominent in the New York National Guard.

HAMBLIN, Thomas Sowerby (1800–53). An American actor, born in Pentonville, London, England. As a member of the Sadler's Wells Theatre Company, he won some success in London, especially at Drury Lane in 1820. In 1825 he came to America and soon gained a reputation as an actor in New York City. In 1830, after extended American tours, he and James H. Hackett leased the Bowery Theatre in New York City and soon after gained entire control of it. He lost heavily when this theatre was burned in 1836, was not very successful in an English tour, and later became manager of the second and of the third Bowery Theatre. The Park Theatre was burned during the first year of his management (1848). "Handsome Tom Hamblin," as he was generally called, was an excellent actor, though somewhat uneven; a liberal manager; an excellent business man; and a great favorite with the public. Hamblin's principal rôles were Hamlet, Macbeth, Othello, Rollo, and Pierre.

HAMBOURG, häm′bo͞org, Mark (1879–). An English pianist, born in Boguchar (southern Russia). He studied the piano with his father and made such amazing progress that at the age of 12 he gave recitals which attracted the attention of serious musicians. Upon the advice of Leschetizky, in 1891, he placed himself for three years under that famous master and reappeared on the concert stage in 1894 in Australia. The next year he was a soloist at the concerts of the Vienna Philharmonic Society, where he created a furore; this was repeated the following year (1896) in London. In 1900 and 1902 he visited the United States. Those who remember Rubinstein claim that Hambourg is temperamentally akin to the great Russian master. At any rate, he belongs to the pianists of the first rank. His memory is prodigious; he has over 30 concertos and about 600 solo pieces in his repertory.

HAMBURG, hăm′bûrg, Ger. häm′bụrk. One of the constituent states of the German Empire, officially called Freie und Hansestadt Hamburg (Free and Hansa City Hamburg). The greater portion lies on the lower Elbe between the Prussian provinces of Schleswig-Holstein, on the north, and Hanover, on the south. It is divided into the metropolitan district (city of Hamburg) and four domains, viz., the Marschlande, the Geestlande, Bergedorf, and Ritzebüttel with Cuxhaven. The state includes several small enclaves in Holstein, several islands in the Elbe, the commune of Moorburg (within Hanover), and the island of Neuwerk, in the North Sea, about 5 miles from Cuxhaven. The area of the state is 414.5 square kilometers (160 square miles), of which 76.9 square kilometers (29.7 square miles) are comprised in the city of Hamburg and 77.8 square kilometers (30 square miles) in the Ritzebüttel with Cuxhaven domain, at the mouth of the Elbe.

Of the total area, there were, in 1900, 200 square kilometers of arable land and garden, 31 of meadow, 72 of pasture, and 18 of woodland. In 1913 rye was cultivated on 2608 hectares, wheat 945, potatoes 1053, oats 3456, and hay 2926. Live stock, Dec. 2, 1912: horses, 21,003; mules and asses, 36; cattle, 12,468; sheep, 2376; swine, 27,628; goats, 6594; fowls, 192,119.

Under its constitution (dating from 1861 and revised in 1879 and 1906) Hamburg is a republic, with the government residing in two chambers, the Senate and the House of Burgesses. The Senate, to which the executive power is chiefly intrusted, is composed of 18 members elected for life by the House of Burgesses. One-half of the senators must have studied law or finance, while at least seven of the remainder must belong to the class of merchants. A chief and second burgomaster, elected annually, preside over the Senate; no burgomaster can be in office for more than two years consecutively. The legislative power resides in the House of Burgesses, upon whose acts, however, the Senate has the right of veto except in matters of taxation; in case of constitutional conflict appeal lies to a joint board of arbitration or to the Supreme Court of the Empire at Leipzig. The burgesses are 160 in number, elected for six years—80 by all taxpayers, 40 by house owners in the city of Hamburg, and 40 by certain specified notables (active or former burgesses, jurists, etc.). The state is represented by one member in the Imperial Bundesrat and by three members in the Reichsrat.

On Jan. 1, 1882, the jurisdiction of the German Zollverein was extended to the lower Elbe, so that the Free Port of Hamburg was restricted to the city and port; in 1888 the rest of Hamburg was taken into the Zollverein, except the Free Harbor, which consists of the port proper and the warehouses for goods in bond. It should be added, however, that a small area at Cuxhaven is still outside the Zollverein. The Free Harbor has an area of 10.20 square kilometers, with 9730 inhabitants in 1910; the free area at Cuxhaven, 0.56 square kilometer, with about 500 inhabitants.

Expenditures and the public debt have greatly increased in recent years. The budget for 1913 showed estimated receipts and expenditures of 170,774,860 marks respectively. Public debt, Jan. 1, 1913, 774,792,838 marks; the debt is largely offset by productive public property, as the harbor and its equipment.

The population of the city and of the State of Hamburg, according to censuses taken December 1, and the increase per cent for the state, are shown below:

YEAR	City	State	Increase
1867........	271,200	306,507	.....
1871........	302,082	338,974	10.92
1880........	412,314	453,869	16.79
1890........	573,198	622,530	20.04
1895........	625,552	681,632	9.49
1900........	705,738	768,349	12.72
1905........	802,793	874,878	13.86
1910........	931,035	1,014,664	15.98

Of the state total in 1910, 929,758 (91.63 per cent) were returned as Evangelicals, 51,036 (5.03) Roman Catholics, 4255 (0.42) other Christians, 19,472 (1.92) Jews, and 10,143 others. In 1911 public primary schools numbered 222, with 2182 male and 1339 female teachers and 115,607 pupils; higher schools, 29, with 14,400 students. The only towns of importance, besides the city of Hamburg, are Bergedorf (with 14,907 inhabitants in 1910), Cuxhaven (14,888), and Ritzebüttel (3140).

HAMBURG. A city in the State of Hamburg, after Berlin the largest city of the German

Empire. It is situated in lat. 53° 33′ N. and long. 9° 59′ E., on the right bank of the northern arm of the Elbe, 75 miles from its mouth at Cuxhaven and 178 miles by rail northwest of Berlin (Map: Germany, D 2 and G 5). Contiguous with Hamburg on the west is the Prussian city of Altona (which includes Ottensen). The river front of Hamburg and Altona extends about 6 miles. Hamburg is the largest port on the Continent and, after London and New York, the largest in the world. Its climate is damp, mild in winter and cool in summer. The mean annual temperature is over 46° F.; rainfall, 28 inches. The city consists of two radically different parts. The central part—since the disastrous fire of 1842 reconstructed according to modern ideas—with broad, well-lighted, well-drained streets, and fine, lofty houses, offers a striking contrast to the remaining part, much of which is devoted to wholesale business and is intersected by canals, along which goods are conveyed in lighters to and from the warehouses. The ancient ramparts, converted into gardens and walks, constitute an inner parklike girdle, separating the old city from its newer parts, in most of which attractive villas may be found. The beauty of the city is greatly enhanced by two large sheets of water formed by the Alster and known as the Binnen-Alster, or Alsterbassin, and Aussen-Alster. They are surrounded by good hotels, handsome private houses, and fashionable promenades. Two splendid bridges span the Elbe, over 60 bridges span the canals in the city, and there are numerous steam ferries. The harbor, with its vast traffic, is one of the sights of the city, and splendid views of it are to be had from different elevations. Of the several fine public buildings, the most noteworthy are the Exchange, containing a commercial library, with over 120,000 volumes; the Rathaus, an elaborate structure in Roman Renaissance, completed in 1897; the Seewarte (the buildings of the German Meteorological Station); and the Deutsches Schauspielhaus, completed in 1900. Hamburg has 35 churches. The church of St. Nicholas (1845–74), built from designs by Sir Gilbert Scott, at a cost of $1,000,000, as a memorial of the fire of 1842, is a fine Gothic building, with a spire 482 feet high; excepting Ulm and Cologne, it is the loftiest church building in the world. St. Michael's (1750–62), in the Renaissance style, is also distinguished by a lofty spire (431 feet). St. Catharine's, dating from the fifteenth century, is archæologically interesting, being one of the few churches that escaped the fire.

Among the streets of Hamburg the Jungfernstieg is the most famous and the busiest thoroughfare. The Alter Jungfernstieg and the Neuer Jungfernstieg are handsome quays, which bound the Alsterbassin. The Neuerwall and the Alterwall, near the Exchange, are the centre of commercial life, and the Rödingsmarkt and the Katharinenstrasse contain fine old residences. Of the new streets, the Kaiser-Wilhelm-Strasse, opened in 1892, is the most important. The Anlagen are a fine public promenade, laid out on the site of the old fortifications, and the Sandthorkai and the Kaiserkai, where the large steamships lie, are the most prominent quays along the Elbe. Hamburg is not rich in public monuments. The statue of Lessing, by Schaper, the monument to the sons of Hamburg who fell in the war of 1870–71, by Schilling, and the Hansa fountain, deserve mention.

Situated on a low plain, far from any mountains, the city derives its drinking water from the Elbe. Formerly this was so polluted that Hamburg suffered from cholera epidemics more than any other city in northern Europe; but from 1893, when a newly devised and enormous filtering plant was put into operation, there was no recurrence of the epidemic until 1905, when there was a slight outbreak. A well-constructed sewerage system drains the city perfectly, discharging the refuse into one sewer tunnel which empties into the river with the outgoing tide. Garbage is burned in municipal crematories erected in 1893. The streets are well paved with asphalt or smooth square stones and are kept very clean, the principal ones being washed and swept every day, and the less frequented ones cleaned a few times a week. The struggle against cholera epidemics led the city authorities to revise also the building regulations. This was necessitated by the fact that the poorer classes of the population are housed in the mediæval portion of the town, in crowded houses facing narrow streets and small, poorly ventilated courts; a considerable part of them (6½ per cent in 1890) lived in cellars. The new rules require more sanitary arrangements and, in case of cellars, more light and better safeguards against dampness.

Hamburg has a large number of hospitals, the most noteworthy being the Epidemic Hospital, opened in 1894, and considered one of the best in the world. Connected with the hospitals are stations equipped with large ovens for disinfection by heat of all kinds of household goods. Food inspection is in charge of the Hygienic Institute, where a thoroughly equipped bacteriological laboratory is maintained. A special sanitary service is maintained in the harbor, to see that all the sanitary regulations are complied with on incoming ships. Municipal baths and washhouses were established in 1855. The establishments are built and run after the British model. (See LIVERPOOL; GLASGOW; MANCHESTER; ETC.) The effect of all these measures is seen in the diminished death rate, which declined from 30 per 1000 in 1865 to less than 20 in 1895, about 15.8 in 1904, and about 14.3 in 1912. In the latter year the birth rate was about 22.7. Hamburg owns both its gas works and electric plant; but they are operated by a private company paying the city a high rental and rendering excellent service under the strict supervision of the city authorities. The street cars are also in the hands of private companies, who pay the city a tax of one pfennig per passenger, in addition to all ordinary taxes levied by the city, besides keeping the streets in repair within the limits of 1 or 2 feet on either side of the tracks. At the expiration of the charter the property of the company reverts to the city. Electricity has supplanted the use of horse power. There is also a line operated by steam, belonging to the Prussian government, and connecting the various railway depots in the city. The fares range from 2½ cents upward, according to class and distance. The charitable institutions are numerous and well endowed. For the purposes of poor relief, the city is divided into 11 districts, which are in turn subdivided into 115 smaller districts. The work of relief is administered by a charity board, composed of three senators and 15 members of the House of Burgesses, elected for five-year terms. There are also a great many private societies and asylums for the relief or reception of needy persons. Besides the hospitals mentioned above, there are two general hospitals, a seamen's hospital, a hospital for tubercular diseases, an establishment for the insane, with an agricultural colony at Langenhorn (1893), and other special institutions.

There are several large and excellent private schools, nearly 200 public schools, a school of art, and conservatory of music, in addition to two Gymnasia, one Realgymnasium, and other secondary schools. The city also maintains a correctional school (Strafschule), to which children may be sent for periods of from eight days to eight weeks, an orphan school, a school for deaf and dumb, and one for the blind. There are, besides, schools for technical instruction, building construction, machine building, navigation, and pharmacy. The municipal library contains over 380,000 volumes and over 7000 manuscripts. The Kunsthalle, or public art gallery, is an important edifice in early Italian Renaissance. Its collection of paintings is extensive, but third-rate. The Natural History Museum is excellent, as is also the Industrial Art Museum. An observatory, botanical museum and gardens, a fine zoölogical museum, and state laboratory are among many other institutions of a scientific or educational nature; there are also several theatres and a great number of public gardens and places of amusement. The first German theatre for opera was established in Hamburg in 1678.

The geographical situation of Hamburg makes it the commercial emporium of northern Europe. Through the Elbe, with its numerous branches and canals, ships leaving Hamburg can reach the heart of Germany; it is also the terminus of seven lines of railway, which furnish direct communication with all the German cities. In 1888 the city of Hamburg (except the Free Port) became a member of the German Customs Union. This stimulated its trade still further, and about 1890 new docks were constructed at Cuxhaven for ocean steamers, involving an expenditure of $40,000,000. The dock and harbor facilities are the most complete in the world; vessels drawing 23 feet can go up the harbor at high tide. The number and tonnage of seagoing vessels entering the port have been as follows: in 1880, about 6000 vessels, of 2,800,000 tons; in 1890, about 8000, of over 5,000,000 tons; in 1905, 15,118, of 10,382,000 tons; in 1912, 15,774, of 13,567,913 tons. In 1880 the merchant marine of Hamburg numbered 475 vessels, of 231,000 tons; in 1890, 587, of 538,000 tons; in 1905, 1087, of 1,362,000 tons; in 1912, 1320, of 1,794,302 tons (of which 765, of 1,538,742 tons, steam).

The leading imports by sea include coffee, wool, grain, cotton, hides and skins, yarn, tobacco, iron, machinery, and wine; the principal exports by sea include sugar, coffee, woolens, cottons, ironware, hosiery, machinery, paper, and tobacco. Hamburg is one of the largest coffee marts and in money-exchange transactions is among the foremost cities of the world. It is also one of the principal emigration ports of Germany. Among the principal industries are cigar making, spirit and sugar refining, brewing, meat curing, machine and ship building, coffee roasting, chocolate manufacture, flour milling, the manufacture of furniture, pianos and musical instruments, mechanical and optical apparatus, leather, ivory, celluloid, etc.

The following table shows, in millions of marks, Hamburg's imports and exports of merchandise in 1903 and 1912, by sea and by the railways and the lower Elbe; it also shows the share of the leading countries in the oversea trade:

	IMPORTS		EXPORTS	
	1903	1912	1903	1912
By sea	2,397.6	4,607.4	2,025.5	3,631.2
By railways and lower Elbe	1,637.4	3,171.2	1,522.4	3,115.6
Total	4,035.0	7,778.6	3,547.9	6,746.8
United States	437.3	680.6	260.2	424.3
United Kingdom	421.4	665.1	472.7	522.4
Argentina	154.9	292.9	52.5	164.9
Brazil	137.1	250.6	72.4	206.5
Russia	155.5	240.1	91.7	217.4
Scandinavia	79.5	197.1	205.6	331.4
Chile	82.7	188.6	41.0	78.4
German ports	83.5	179.5	215.6	410.4
France	58.7	80.5	22.4	60.4
Netherlands	44.5	57.5	36.4	61.6
Belgium	30.4	30.0	27.7	52.2

Hamburg is the seat of the upper Hanseatic court and of the three provincial courts of Bremen, Hamburg, and Lübeck.

Hamburg virtually has a municipal fire-insurance institution, making insurance compulsory for every householder; it also subsidizes a private employment bureau and maintains a municipal pawnshop, established in 1650.

The 1910 census disclosed a population of 931,035 (returns of previous censuses are shown in the preceding article). Important districts of the city which lie outside of the old city proper include: Borgfelde (pop., 34,200); Hohenfelde (31,200); Uhlenhorst (41,140); Rotherbaum (31,350). The population of Altona (which is contiguous with Hamburg and includes Ottensen) was 172,628; population of the two cities, 1,103,663. Hamburg and Bremen are the chief emigration ports of Germany. Emigrants from Hamburg in 1903 numbered 144,560 (of whom 20,238 German); in 1911, 86,895 (6507).

Somewhere between 805 and 811 Charlemagne is said to have founded the castle of Hamburg as a defense against the heathen Slavs. In 831 an episcopal see was erected there (soon to be united with that of Bremen), and Hamburg became a centre of civilization for north Europe. The town was repeatedly burned and plundered by Norsemen, Danes, and Slavs. In 1189 it received important commercial privileges from Frederick Barbarossa. By treaties with Lübeck and Bremen, in 1241 and 1249, it initiated the Hanseatic League (q.v.). From that time it increased rapidly in wealth and commercial importance, augmenting its territory by the purchase of the township of Ritzebüttel, at the mouth of the Elbe (where the harbor of Cuxhaven is now situated), and several villages and islands in the vicinity of the town. Under the protection of the German emperors Hamburg soon became powerful enough to defend itself and its commerce, both by sea and land, and carried on war for a considerable period against the Dutch and the Danes, though with varying success. Maximilian I declared Hamburg an Imperial city in 1510, though the act was not confirmed by the Imperial Chamber till 1618. In 1529 the city officially adopted the Reformed religion, and the large number of religious refugees from the Iberian Peninsula and Holland enriched it greatly during the sixteenth and seventeenth centuries. Its commerce developed wonderfully, owing to the American and French revolutions, the wars between England and France, and the downfall of the trade of the Netherlands. It was occupied by the French after the battle of Lübeck, in 1806. Napoleon's continental system, however, proved fatal to its commerce, especially after 1810, when it was made a part of the French Empire. In 1813–14 the city endured a terrible reign of pillage and oppression at the hands of the French general Davout. By 1814 its population had sunk from 100,000 to 55,000. In 1815 it entered the German Confederation as a free city of the Empire. It thrived exceedingly, in spite of a disastrous fire which swept off a quarter of the city in 1842. After forming part of the North German Confederation, Hamburg became a member of the German Empire in 1871. Jealousy of its commercial privileges kept Hamburg out of the Zollverein till 1888. In 1892 a severe outbreak of cholera killed nearly 9000 of the inhabitants.

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HAMBURG, hăm′bûrg. A breed of domestic fowls, noted as economical egg producers. They are of trim build, resembling Leghorns, and of great beauty of plumage. Six varieties are recognized—the golden-spangled, silver-spangled, golden-penciled, silver-penciled, black, and white. The large black redcap and the Dutch campine are also in this class. The designations refer to the markings. The "spangles," or "moon eyes," are round or oval spots; the "pencilings" are bars of reddish bay or black, or of clear silvery white and black. The most popular varieties are the spangled (see Colored Plate of Poultry), because of their fine form as well as beauty of coloration. Their "points" are as follows: Comb, square at front, tapering nicely into a long spike, full of points by no means plain, firmly and evenly set on the head; face, red; ear lobes, moderate size, round as possible, and clear white; legs, leaden blue; carriage, graceful; plumage, very profuse. (Thus far the specifications belong to the whole Hamburg breed.) Silver-spangled cock: Color, clear, silvery-white ground, every feather tipped or spangled, the breast as bold as possible, but showing the spangle, the bars of the wing regular and bold; neck, back, and saddle nicely tipped; bow well marked (by no means cloudy, brown, or brassy); back as green as possible. Silver-spangled hen: The white clear and silvery, the spangles large, green as possible, distinct and clear. Golden-spangled cock: Ground, rich; clear spangles, large and distinct. Hen: Color, very black and rich ground, the back glossy green; the neck, back, and saddle nicely striped; bow of wing well marked.

HAM′DEN. A town in New Haven Co., Conn., 5 miles north of New Haven, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, D 4). It is in a fertile agricultural region and has some manufactures. Pop., 1900, 4626; 1910, 5850.

HAMDI BEY, häm′dē bā, Osman (1842–1910). A Turkish statesman and scholar, son of Edhem Pasha, born in Constantinople and educated in Paris. He was Governor of Bagdad (1868–70), a delegate to the Vienna Exposition in 1873, General Secretary of Foreign Affairs, then Governor of Pera, in 1882 director of the Imperial museums at Stambul, and (1888) connected with the Department of the National Debt. A painter, with some reputation for his rendering of Oriental interiors, he founded in 1882 a Turkish Ecole des Beaux-Arts, which is not limited in its courses by the provisions of the Koran. He edited with Reinach *La nécropole royale de Sidon* (1892–93), and built at his own expense, near the Tchinili Kiosk, a Greek building in Constantinople, in which the sarcophagi from the Sidon Necropolis might rest.

HA′MEL, Gustav (1889–1914). A British aviator, educated at Westminster. He took up aviation in 1910 and soon became one of the most expert and daring of airmen. He won the Brooklands to Brighton air race in 1911 and represented England in the Gordon Bennett trophy race for that year. He won the first Aërial Derby in a flight around London in 1912 and also won the *Daily Mail* prize in 1913 in a race around Greater London, making 94½ miles in 1 hour, 15 minutes, and 49 seconds. On his return trip to London from Paris in a new Morane-Saulnier monoplane he was lost in the English Channel in May, 1914. He published *Flying: Some Practical Experiences* (1914).

HAMEL, ȧ′mĕl′, Louis Ernest (1826–98). A French historian and politician, born in Paris. He was educated at the Lycée Henri IV and in the law school of the University of Paris; but he practiced little, preferring literature and politics. He was a contributor to the Liberal sheets, was an editor of *L'Homme libre*, was three times defeated as candidate for the National Assembly, but in 1878, 1881, and 1884 was elected to the Parisian municipal council. Besides his earliest work, *Les derniers chants*, a book of verse (1851), his writings are historical: *Histoire de Saint-Just* (1859); *Histoire de Robespierre* (1865–67), in three volumes, of which the publishers refused, for fear of prosecution, to publish the last two volumes until they were compelled to do so at their own risk by legal decision; *Monsieur Michelet, historien* (1869); *Précis de l'histoire de la révolution française* (1870); *Histoire de la république française sous le Directoire et sous le Consulat* (1872); *Histoire des deux conspirations du général Malet* (1873); *Histoire illustrée du second Empire* (1873); *Souvenirs de l'homme libre* (1878); *Histoire du premier Empire* (1882); *Histoire de la Restauration* (1887); *Histoire du règne de Louis Philippe* (1889); *Histoire de la seconde République* (1891); *Histoire du second Empire* (1893–94).

HAMELIN, hăm′e-lĭn, The Pied Piper of. See Pied Piper of Hamelin.

HAMELN, hä′mĕln. The capital of a district in the Prussian Province of Hanover, situated at the confluence of the Hamel with the Weser, 25 miles southwest of Hanover. The

Weser is crossed by a large suspension bridge. The town contains many specimens of mediæval and Renaissance architecture, including old churches and the so-called "Hochzeitshaus." It has a large Gymnasium, an agricultural and dairy school, and a school for navigation. The chief manufactures are paper, leather, carpets, chemicals, tobacco, sugar, textiles, castings, and ships. The commerce is quite important, and the harbor supports large salmon fisheries. Hameln is noted on account of the legend of the Pied Piper of Hamelin (q.v.).

Hameln had its origin in the ninth-century abbey of St. Boniface. It was sold to the Bishop of Minden in 1259, but the transaction did not meet with the approval of the townspeople, who after a bloody battle placed themselves under the protection of Brunswick. The town was a flourishing member of the Hanseatic League. It was taken by the Swedes in 1633 and surrendered to the French in 1757 and in 1806. It finally passed to Prussia in 1866. Pop., 1900, 18,965; 1910, 22,061.

HAMERIK, hä′me-rĭk, Asger (1843–). A Danish composer. He was born at Copenhagen and, despite the opposition of his parents, studied music unaided, and when but 15 years of age had so far succeeded in his ambition as to be able to study openly, under Gade, Matthison-Hansen, and Haberbier. In 1862 he went to Berlin to become a pupil of Von Bülow, and two years later, when studying in Paris, met Berlioz, with whom he visited Vienna (1866–67). His *Hymne de la paix,* written for the Paris Exhibition, earned for him a gold medal and was greatly esteemed for its splendid orchestration. He wrote several operas, which were produced either in France or Italy, and in 1871 was appointed director of the Peabody Conservatory of Baltimore and also of the Peabody symphony concerts. In 1890 the King of Denmark conferred upon him the honor of knighthood. In 1898 he resigned his post in Baltimore and returned to Europe. Among his more important works are the operas *Der Wanderer* (1872) and *La Vendetta* (1870); the choral works *Christliche Trilogie* and *Jüdische Trilogie.* The operas *Tovelille* and *Hjalmar and Ingeborg* were given only in part. He also composed five symphonies and much successful chamber music.

HAMERLING, hä′mẽr-ling, Robert (1830–89). An Austrian poet, dramatist, and novelist, born March 24, 1830, at Kirchberg am Walde in Lower Austria. For four years he was a choir boy at the Cistercian monastery of Zwetl. Later he went to a Gymnasium in Vienna and afterward matriculated for the study of medicine. Besides natural science, Hamerling cultivated classical and Oriental languages and also philosophy. In 1855 he became a professor in Triest, but 10 years later chronic illness forced him to withdraw. An Imperial decree now granted him a pension, and he was likewise assisted by a Viennese lady. On July 13, 1889, after years of pain, he died in his villa near Graz. Hammerling's style is rich and highly colored, his ideas are daring and keen. His mastery over his language is notable. Among his many writings some of the most striking are, in lyric poetry: *Ein Sangesgruss vom Strande der Adria* (1857); *Sinnen und Minnen,* youthful poems (1859, 1886); *Gesammelte kleinere Dichtungen* (1871, 1890); *Blätter im Winde* (1887, 1888); in epic poetry: *Ahasver in Rom* (1886; 27th ed., 1902), a description of Nero's Rome; *Der König von Sion* (1868, 1890); *Amor und Psyche* (1882); *Homunculus* (1880, 1890); in the drama: *Danton und Robespierre,* a tragedy (1871, 1877), and the comedy *Lord Lucifer* (1880). He wrote also *Aspasia* (1876), a novel of the time of Pericles, and a cantata *Die sieben Todsünden* (1873). Selections from his *Works* appeared in 1901. Consult: Kleinert, *Robert Hamerling, Ein Dichter der Schönheit* (Hamburg, 1889); Polzer, *Robert Hamerling: Sein Wesen und Wirken* (ib., 1890); Rabenlechner, *Hamerling: Sein Leben und seine Werke* (ib., 1895); id., *Hamerling* (Dresden, 1902); and the autobiography, *Stationen meiner Lebenspilgerschaft* (1889).

HAM′ERTON, Philip Gilbert (1834–94). An English writer on art, painter, and etcher. He was the son of a solicitor and was born at Laneside, near Shaw, Lancashire. His mother died when he was an infant, and his father, who was an inebriate, died 10 years later. For these and other reasons Hamerton's boyhood was lonely. He gave up in displeasure his preparation for Oxford, turned to poetry and art, and began writing for the reviews. He traveled in Wales, visited France, and in 1857 began his periodic encampments on an island in Loch Awe in the Scottish Highlands, described in *A Painter's Camp in the Highlands and Thoughts about Art* (1862). This notable work was followed by the more technical *Etching and Etchers* (1868); *Contemporary French Painters* (1868); *Painting in France after the Decline of Classicism* (1869). In 1869 he founded the *Portfolio,* an excellent art magazine, which he edited till his death. Among his other numerous writings are: *The Intellectual Life* (1873); *Life of Turner* (1879); *The Graphic Arts* (1882); *Human Intercourse* (1884); *Landscape* (1885); *French and English* (1889). Hamerton, who had married a Frenchwoman, passed his latter years in France and died at Boulogne-sur-Seine. Like Ruskin, Hamerton was an art interpreter to his generation, the medium between the artist and the public. For this he was eminently suited because of the catholicity of his taste and his agreeable style. Consult *Philip Gilbert Hamerton: An Autobiography and a Memoir by his Wife* (London, 1896).

HAMESUCKEN. See Hairnsucken.

HAMI, hä′mė, or **KHAMI,** kä′mė, or **KOMUL,** kō′mụl. A small town of Chinese Turkestan, situated in a fertile district 30 miles south of the east end of the Tien-shan, or "Celestial Mountains," near the northern verge of the desert of Gobi, about 60 miles southeast of Barkul (Map: China, F 3). Its elevation above the sea is about 3000 feet. The oasis of Hami, which has an area of between 80 and 100 square miles, produces wheat, barley, maize, millet, pumpkins, watermelons, and excellent grapes. The poppy is also grown. The "town" consists of an old town (Laocheng), built about two centuries ago, and a new town (Sin, or Hsin, Ch'êng), surrounded with moated walls, 20 feet in height, pierced with four gates, each surmounted with a tower in true Chinese style. The Mohammedan quarter, built over 300 years ago and called Khamil, is about a mile off. It is surrounded by a mud wall and contains some 250 to 300 families. Here the kings of Hami lie in a mausoleum, the dome of which is covered with green-colored tiles. The population of the old town is said to be about 5000. Hami is advantageously situated as a trade centre, as here the great travel route from the east to west forks into two branches—one, the Tien-shan Nanlu, running along the south side of the Celestial Mountains to Kashgar and Yarkand; and the other, the Tien-shan Pei-u, proceeding by an easy pass 9000 feet high over the mountains along their northern foot to Kulja and beyond.

HAMIL'CAR (Phœnician, servant of Melkart, Gk. 'Αμίλκας, *Amilkas*). A name borne by several distinguished Carthaginians, the most celebrated of whom were: 1. The commander of the great Sicilian expedition 480 B.C. (See Carthage; Sicily, *History*.) 2. One of the commanders of a Carthaginian army defeated by Timoleon (q.v.), the Corinthian general, at the Crimissus 339 B.C. 3. (Surnamed Rhodanus), the Ambassador to Alexander the Great after the fall of Tyre (332 B.C.). 4. Governor of Sicily (317 B.C.). 5. The son of Gisco, who succeeded the preceding and carried on military operations against Syracuse and other states with great success, but was at length taken prisoner and put to death (309 B.C.). 6. A commander during the First Punic War, who was very successful against the Romans by land in Sicily, but was afterward defeated in a sea fight off Ecnomus (256 B.C.) and was thereafter recalled to Africa to oppose Regulus.

7. The greatest of all was Hamilcar, surnamed Barca, or Barak, 'lightning' (c.270–228 B.C.). While very young, he was appointed to the command of the Carthaginian forces in Sicily, in 247 B.C., at which time the Romans had possession of almost the whole island. Hamilcar's first care was to discipline his infantry thoroughly; he then established himself on Mount Hercte (Ercte) and from this point made pillaging excursions in all directions, sending his privateers along the coast of Italy as far north as Cumæ, thus obtaining abundant supplies for his troops. From this position the Romans endeavored to dislodge him, but in vain. After three years he left Hercte and established himself on Mount Eryx, keeping up his communication with Drepanum and the sea, where the same tactics were repeated on both sides, and with the same want of success on the part of the Romans. The Carthaginian admiral, Hanno, having been totally defeated off the Ægates Islands (241 B.C.), Hamilcar was compelled to evacuate his fortress and abandon Sicily. While Hamilcar was engaged in Sicily he had made large promises to his mercenary troops which, after his return to Africa, he was unable, through lack of support from the government, to fulfill; they revolted in consequence and were joined by some of the African tribes. Hanno (see Hanno, 5) endeavored to suppress the revolt, but failed; Hamilcar was accordingly appointed to the command and succeeded in utterly defeating the rebels, capturing all their towns and putting to death their leaders. Hamilcar was next appointed commander in chief of the Carthaginian army and was engaged for some time in wars with the neighboring tribes, which were abruptly ended by Hamilcar's entering upon his Spanish campaign about 236 B.C. His great aim was to found a new empire in Spain, from which, as his basis, he might assail the Romans. Such a kingdom he saw would increase the power and wealth of his native country and atone to her for the loss of Sicily and Sardinia. This end he did not himself accomplish, but he prepared the way for its accomplishment by his son-in-law Hasdrubal and his son Hannibal. He marched westward, while the fleet under Hasdrubal cruised along the coast; he then crossed the Strait of Gibraltar and made war on the natives of Spain, in the course of which he penetrated to the very heart of the country, subdued many tribes and cities, and amassed immense wealth. He spent nine years in Spain and at length (228 B.C.) met his death while fighting against the Vettones. His military genius is thought scarcely inferior to that of Hannibal. His life by Cornelius Nepos is extant. Consult Dodge, *Hannibal* (New York, 1891), and the article "Hamilcar," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912). See Carthage; Hannibal; Rome, *History*; Scipio.

HAM'ILL, Howard Melancthon (1849–1915). An American clergyman and leader in Sunday-school work. He was born at Lowndsboro, Ala., graduated from East Alabama College in 1868, and served in the army of Gen. R. E. Lee in 1864–65. He entered the ministry of the Methodist Episcopal church in 1885, but later joined the Methodist Episcopal Church South, and was placed in charge of the Sunday-school-teacher training of that denomination. For some time a trustee of the International Sunday School Association, at the convention held in Chicago in June, 1914, he was elected its president. He is author of several books and pamphlets relating to Sunday-school work.

HAM'ILTON. The capital of Dundas and Normandy counties, in the western district of Victoria, Australia, on Grange Burn Creek, 50 miles northeast of Portland, and 198 miles west of Melbourne, with which it has railway connection (Map: Victoria, B 5). It is a pastoral, agricultural, and stock-raising centre, with important semiannual exhibitions and race meetings. It has a large export trade in frozen mutton. It is an educational centre for a large area and contains several good denominational institutions. Pop., 1911, 5000.

HAMILTON. The capital of the Bermudas (q.v.), situated on Hamilton Island. Pop., 1901, 2246; 1911, 2627.

HAMILTON. The capital of Wentworth Co., Ontario, Canada, and port of entry on Burlington Bay, at the southwest extremity of Lake Ontario, 39 miles southwest of Toronto, on the Grand Trunk, the Canadian Pacific, and the Toronto, Hamilton, and Buffalo railroads (Map: Ontario, E 7). There are also three electric radial railways. The city has a fine harbor protected by a sand bar 5 miles in length, daily steam communication with lake ports, and an extensive trade with the Maritime Provinces. Hamilton is the centre of west Ontario's fruit district. Owing to the large investment of American and British capital, an abundance of electrical power, derived from Decew Falls, 35 miles southeast of the city, cheap natural gas from the Welland field, and its excellent transportation facilities by both rail and water, Hamilton is one of the most important manufacturing centres of Canada. The output of its numerous industries comprises steel and iron goods, sewing machines, agricultural implements and machinery, glass, electrical wires, cables, and appliances, clothing, store fixtures, stoves, elevators, boots, furniture, cotton, woolen, and tobacco products, musical instruments, and many other manufactures, numbering in all about 400 establishments. The value of its manufactured output, which is next after those of Montreal and Toronto, was, in 1910, $55,125,946, as compared with $17,122,346 in 1900, an increase of 221.95 per cent. The United States is represented by a consul. The city sends two representatives to the Dominion House of Commons and two to the Provincial Legislature; it is the seat of Anglican and Roman Catholic bishops. There are four hospitals. The city, laid out in 1813 and incorporated in 1833, is built on a plateau, has wide streets, market and county-house squares, and many elegant residences. It is the seat of a provincial normal college, a conservatory of music, Highfield School, and a government lunatic asylum. Other features include the post office, customhouse, city hall, public library, Dundurn, Victoria, and other parks, a fine race course, boat, yacht, and bathing houses, and summer hotels. The city owns and operates its water works. Pop., 1891, 48,959; 1901, 52,550; 1911, 81,969; 1914 (local est., with suburbs), 100,000.

HAMILTON. A market town and municipal borough in Lanarkshire, Scotland, on the left bank of the Clyde, 11 miles southeast of Glasgow (Map: Scotland, D 4). The inhabitants are chiefly employed in neighboring coal and iron mines and limestones quarries; market gardening and muslin weaving are minor industries. The town is irregularly built on rising ground, commanding fine views. Its prominent structures are the burgh buildings with a clock tower 130 feet high, the county buildings, in the Grecian style, and the cavalry barracks. The town owns its gas and water works. It gives the title to the premier peer of Scotland, the Duke of Hamilton and Brandon, whose famous family seat, Hamilton Palace, in the midst of extensive pleasure grounds, is adjacent to the demesne of Cadzow Castle with the remains of its forest, where primeval oaks and a herd of the original breed of wild cattle are preserved. On the opposite bank of the river Avon is the summer château of Chatelherault, built in 1732 by the then Duke of Hamilton, in imitation of the house whence he derived his French title of Duke. Two miles north of the town is the famous Bothwell Brig, where the Covenanters were defeated in 1679. Pop., 1901, 32,775; 1911, 38,644. Consult Grant, *The Commissariat Record of Hamilton* (Edinburgh, 1898).

HAMILTON. A village in Madison Co., N. Y., 29 miles southwest of Utica, on the New York, Ontario, and Western Railroad (Map: New York, E 5). It is the seat of Colgate University (q.v.), established in 1818, with the Hamilton Theological Seminary (Baptist). Lumber yards and a canning factory represent the leading industries. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 1627; 1910, 1689.

HAMILTON. A city and the county seat of Butler Co., Ohio, 25 miles by rail north of Cincinnati, on the Great Miami River, the Miami and Erie Canal, and the Cincinnati, Hamilton, and Dayton, the Pittsburgh, Cincinnati, Chicago, and St. Louis, and the Ohio Electric railroads (Map: Ohio, A 7). The splendid water power derived from both the river and canal has materially aided the city's development as a manufacturing centre; its industrial establishments include breweries, paper, flour, and woolen mills, engine works, iron foundries, machine shops, large safe and bank-vault factories, felt, underwear, and tin-can factories, and agricultural-implement and tool works. The city contains the Notre Dame Academy, Hamilton Children's Home, and Mercy Hospital. The first settlement here was made in 1791, when Gen. Arthur St. Clair built a fort and called it Fort Hamilton in honor of Alexander Hamilton. Hamilton was first incorporated as a town in 1810. It is now governed, under the municipal code of 1902, by a mayor, chosen biennially, a council of nine members, chosen biennially, directors of public service and of public safety, sinking-fund trustees, appointed by the mayor, and the city solicitor and city auditor, elected by the people. The water works, gas plant, and electric-light plant are all owned and operated by the city. Pop., 1890, 17,565; 1900, 23,914; 1910, 35,279; 1914 (U. S. est.), 38,814.

HAMILTON. A famous noble Scottish family of English origin. The name, obviously territorial, was doubtless taken from some one of the many English manors called Hamilton, scattered through Buckinghamshire, Hampshire, Surrey, Lancashire, Rutlandshire, Yorkshire, and Leicestershire. The pedigree of the family is traced to "Walter Fitz-Gilbert (or Gilbertson) of Hamilton," who in 1296 held lands in Lanarkshire and swore fealty to King Edward I of England as overlord of Scotland, and in 1314 kept the castle of Bothwell, on the Clyde, for the English. His early surrender of this strong fortress, and of the English knights and nobles who had fled to it from the field of Bannockburn, was rewarded by King Robert Bruce by grants of the lands and baronies of Cadzow and Machanshire in Clydesdale, Kinneil and Larbert in West Lothian, Kirkinner and Kirkowen in Galloway, and other lands forfeited by the Comyns and other adherents of England. He attained the rank of knighthood, and married Mary, a daughter of Sir Adam Gordon of Huntly, by whom he left two sons. To a long list of illustrious descendants accrued the titles, emoluments, and territories comprised in the lordships of Abercorn, Bargeny, Belhaven and Stentoun, Hamilton, Pisley, and Strabane; in the viscountships of Boyne, Clanboy, Hamilton, and Strabane; in the earldoms of Arran, Abercorn, Clanbrassil, Haddington, Orkney, Ruglen, and Selkirk; in the marquisates of Abercorn and Hamilton; and in the dukedoms of Abercorn, Brandon, Chatelherault, and Hamilton. The present leading representatives are Alfred, thirteenth Duke of Hamilton and Brandon, surname Douglas-Hamilton, premier peer of Scotland and hereditary keeper of Holyrood Palace, and James, second Duke of Abercorn, surname Hamilton, Groom of the Stole. Consult: Anderson, *Historical and Genealogical Memoirs of the House of Hamilton* (London, 1823); Fraser, *History of the Earls of Haddington* (Edinburgh, 1889); G. H. Johnston, *The Heralding of the Hamiltons* (ib., 1908).

HAMILTON, Alexander (1757–1804). An eminent American statesman. He was born at Charles Town, in the island of Nevis, West Indies, on Jan. 11, 1757, and appears to have been the natural son of a Scottish trader named James Hamilton, who died on the island of St. Vincent about 1799, and Rachel Levine, originally named Faucette, and of French-Huguenot descent, who some time previously had separated from her husband. After a brief period of schooling, the future statesman at the age of 12—his mother having died in the previous year—was placed in a counting house at Christian-sted, on the island of St. Croix; but having shown signs of literary ability, especially in a pamphlet describing a West Indian hurricane, he was sent to the English colonies on the continent when 16 years of age, for the purpose of continuing his education. Arriving in Boston in October, 1772, he proceeded at once to New York, studied for a year in a grammar school at Elizabethtown, N. J., and then entered King's College (now Columbia University). He soon became intensely interested in the controversy then raging between the Colonies and the British government and, partly as a result of a visit to Boston during the tension consequent upon the passage of the Boston Port Bill (q.v.), became firmly attached to the patriot cause. On July 6, 1774, he attended in New York a great meeting in the "fields" (now City Hall Park), assembled to take action on the calling of a general congress, and made extemporaneously an impassioned but well-reasoned speech, which brought him to the notice of men of prominence and of the people generally. Soon afterward he published anonymously two remarkable pamphlets—*A Full Vindication of the Measures of Congress from the Calumnies of their Enemies* (1774) and *The Farmer Refuted* (1775)—in answer to those of a "Westchester Farmer," then much read, and in them endeavored to prove that the Colonies owed allegiance directly to the British crown, were therefore not amenable to Parliament, and were justified in resorting to extreme measures to vindicate their rights. The pamphlets were at first variously attributed to such men as Jay and Livingston, and, their authorship finally becoming known, they added greatly to Hamilton's growing reputation. In 1775 he twice took a stand, as an advocate of order, against mobs bent on chastising Loyalists. Meanwhile, perceiving that an outbreak of hostilities was imminent, he had devoted himself to the study of military science, and, after serving for a time in a volunteer corps, he was appointed, on March 14, 1776, to the command of an artillery company, which soon became so conspicuous for the excellence of its drill that Nathanael Greene, under whose notice it fell, introduced Hamilton to General Washington with a recommendation for advancement. During the retreat after the battle of Long Island, Hamilton distinguished himself by the coolness and courage with which he brought up the rear. He also attracted attention by the skillful manner in which he served his battery at White Plains, participated in the retreat through New Jersey and in the battles of Trenton and Princeton, and on March 1, 1777, became an aid on the staff of General Washington, with the rank of lieutenant colonel. In this capacity he acted as Washington's confidential secretary, attending to much of the correspondence from headquarters, and in November, 1777, was sent on a delicate mission to Albany for the purpose of securing reënforcements from General Gates and General Putnam.

In December, 1780, he married Miss Elizabeth Schuyler, the daughter of Gen. Philip Schuyler, thus allying himself with one of the most influential families in New York. In February, 1781, in a fit of resentment, he left the staff of the commander in chief because the latter had rebuked him, on the ground of disrespect, for a delay in obeying orders; and, returning to the line, he successfully led one of the attacking columns at Yorktown (q.v.).

Soon after the outbreak of the war he had begun to take a lively interest in the financial and administrative problems that confronted the Confederation, and in 1780 and 1781 wrote able letters to Duane and Morris respectively, pointing out the defects in the Articles of Confederation, and the necessity of a strong central government, and proposing an elaborate scheme for the reorganization of the finances and the establishment of a bank. From May to November, 1782, he acted as receiver of continental taxes in the State of New York and was a member of the Continental Congress in 1782–83, during which time he took a conspicuous part in all debates concerning taxation and finances generally, served on various important committees, proposed an elaborate plan for a military establishment in time of peace, and became convinced, even more strongly than before, of the weakness of the existing government and the need for complete reorganization. Early in the summer of 1782, after a brief course of study, he had been admitted to the bar at Albany, and upon leaving Congress he took up with assiduity the practice of his profession in New York, meeting with immediate success. He attracted particular attention by his advocacy of the liberal treatment of Loyalists, and in the celebrated case of Rutgers *v.* Waddington braved popular opinion by attacking the "Trespass Act" of New York, which provided that a Whig dispossessed by the British could collect rent from those who had occupied his property during his absence. Besides practicing his profession, he took part in the discussion of public measures, was one of the founders of a State bank, and was active in the organization of the Society of the Cincinnati. During the most critical period of national history he vigorously aided the movement for a stronger central government. He, with Egbert Benson, represented New York in the Annapolis Convention of 1786 (q.v.), and it was he who drafted the report which led to the assembling of the Constitutional Convention at Philadelphia in the following year. Upon his return from Annapolis he was elected to the State Legislature and was there instrumental in securing the appointment of delegates from New York to the approaching convention, he himself being chosen, along with Robert Yates and John Lansing. Though his influence in the convention was to a great extent nullified by the opposition of his strongly Anti-Federalist associates, who finally withdrew altogether, as did Hamilton for a time, he exerted himself, while in attendance, to impress upon the delegates the need of a thorough reorganization of the government, and in June, 1787, made an elaborate speech in which he expressed a warm admiration of the British constitution, and proposed a plan which provided for a strong and virtually independent executive and the subordination of the individual States to the central government—the executive and Senators to hold office during good behavior, the State governors to be appointed by the central government and to have a veto on all State legislation, and the Lower House of Congress to be elected directly by the people. He vigorously supported the Constitution as finally adopted, especially by his production, with Madison and Jay, of the *Federalist* (q.v.), which exerted a powerful influence and remains the best contemporary exposition of that document; and in the New York convention achieved a remarkable triumph by securing ratification in face of an

Anti-Federalist majority at the outset of 65 to 19, making numerous speeches and finally winning over Melanchthon Smith himself, who had led the debate on the opposing side.

In September, 1789, six months after the organization of the general government under the new Constitution, Congress passed an Act establishing a Treasury Department, and President Washington immediately selected Hamilton as first Secretary of the Treasury. In the then unsettled state of the country financially and economically, this was a position of primary importance, and during his term of office Hamilton rendered to the nation services scarcely less invaluable than those of Washington himself. With tireless energy and remarkable ability he applied himself to the various economic problems which then pressed so insistently for solution, and in report after report laid down policies which, adopted by Congress, reëstablished the public credit, brought prestige to the national government in spite of the disintegrating tendencies of the time, and formed precedents which for the most part have since been followed and have thus in some lines determined the whole subsequent history of the nation. His reports dealt, among other things, with the public credit, the raising and collection of the revenue, estimates of income and expenditures, the temporary regulation of the currency, navigation laws, and the coasting trade, the organization of the post office, the management of the public lands, the purchase of West Point by the national government, the establishment of a mint, the founding of a national bank, the policy of the government with regard to manufactures, and the adoption of an excise; and, in addition, when, at the close of 1791, his administration was attacked as corrupt by the opposition under the lead of Madison and Giles, he sent into Congress a succession of detailed reports, setting forth the operations of his department with such comprehensiveness and lucidity as to turn abuse into praise and utterly to refute the charges of his assailants. His proposals that the national government should assume the Revolutionary debts of the individual States, that Congress should establish a national bank by virtue of the "implied powers" granted by the Constitution—the first suggestion of this doctrine—and that Congress should impose an excise—all of which had in view the strengthening of the central government—precipitated successive controversies in which those who favored Hamilton were uniformly successful, though party lines were sharply drawn, and a powerful opposition, strenuously antagonistic to centralization, was created, under the leadership of Hamilton's great rival, Thomas Jefferson (q.v.). Out of these controversies grew the Federalist and Republican (later Democratic or Democratic-Republican) parties. Hamilton also took an active interest in foreign affairs and, during the Revolutionary turmoil in Europe and the wars between France and England, uniformly advocated a policy of strict neutrality on the part of the American government; while by his attitude towards Genet (q.v.) and his well-known views concerning the excesses of the French Revolution, as well as by his freely expressed admiration of the British constitution, he gave color to the charge frequently brought against him by his opponents, that he was the leader of a strongly pro-English and anti-French faction. At the time of the Whisky Insurrection (q.v.) he advocated the adoption of a vigorous repressive policy on the part of the national government and accompanied in person the troops which were sent against the insurgents. On Jan. 31, 1795, he resigned from the cabinet to resume the practice of his profession in New York City, but kept in close touch with political affairs, continued to be consulted by Washington, and maintained unimpaired his commanding influence in the Federalist party. He vigorously upheld the Jay treaty (q.v.), in support of which he wrote a series of powerful articles, under the signature "Camillus"; assisted Washington materially in the preparation of his Farewell Address; opposed the first drafts of the Alien and Sedition Acts (q.v.); and strongly combated the doctrines of the Virginia and Kentucky Resolutions (q.v.). A coolness which had appeared in the relations between Hamilton and John Adams (q.v.) as early as 1788, owing to the former having exerted his influence to prevent an equal vote being cast for Washington and Adams, gradually became pronounced and was especially marked after the election of the latter to the presidency, when Hamilton, though holding no office, exerted perhaps as much influence over the members of the cabinet as did the President himself. Hamilton, moreover, strongly disapproved of the mildness and apparent indecision of President Adams's policy towards France. (See X Y Z CORRESPONDENCE.) At Washington's request, however, he was placed in 1798 at the virtual head of the army when hostilities with France appeared imminent, and while acting in this capacity, with the rank of major general and the position of inspector general (from July 19, 1798, to June 15, 1800), he devoted himself with energy and ability to the task of organization and preparation, effecting various much-needed reforms and perfecting plans for the invasion of Louisiana and the Floridas. In the presidential election of 1800 Hamilton showed a preference for Pinckney over Adams for the presidency, and by publishing an ill-advised pamphlet sharply criticizing Adams and advocating the casting of an equal vote by the Federalists for their two candidates, he greatly weakened his party and deeply offended Adams and his immediate following. When, after the election, the famous contest for the presidency arose in Congress, he suppressed his strong dislike for Jefferson and by the use of his powerful influence was instrumental in securing the defeat of Burr. With the fall of the Federalists Hamilton's political career virtually ended. In 1804 Burr, who had at various times been balked in his political schemes by Hamilton, challenged the latter to a duel, on the ground of an alleged insult, and Hamilton, feeling that by refusing to acknowledge the accepted code, of which he strongly disapproved, he would lose his influence, and anticipating a crisis in the affairs of the nation with which he would probably be called upon to deal, consented to a meeting. The duel occurred at Weehawken, N. J., on July 11, and Hamilton fell, mortally wounded, at the first fire—having, it is said, discharged his own weapon into the air. He died the following day.

Hamilton's services to the nation can scarcely be overestimated. At a time when disintegrating tendencies were pronounced, when, British rule having been overthrown, the mass of the people were restive under any restraint, and when financial and economic ruin threatened the very existence of the nation, he contended steadily for the establishment of a strong central government, initiated various measures which were influential in bringing about such a result, and did more than any other man to put the nation on a firm financial footing, to restore the public credit, and to inculcate in the minds of the people sounder views than were then current with regard to political economy and finance. Judged by modern economic standards, some of his opinions show confusion of thought with regard to capital and wealth, but for the most part he undoubtedly saw further and clearer in his own special field than any of his contemporaries. He was not, however, like Jefferson, a great political leader, and, frankly distrusting the people, a large element of whom distrusted him in return, he never had a large personal following.

The best edition of Hamilton's *Works* is that by H. C. Lodge (9 vols., New York, 1885–86). Consult: J. C. Hamilton, *History of the Republic of the United States as Traced in the Writings of Alexander Hamilton and his Contemporaries* (7 vols., New York, 1857–64; 4th ed., 7 vols., Boston, 1879); J. C. Hamilton, *Life of Alexander Hamilton* (2 vols., New York, 1834–40), unfinished; Morse, *Life of Alexander Hamilton* (2 vols., Boston, 1876); Shea, *Life and Epoch of Alexander Hamilton* (New York, 1879); Lodge, *Alexander Hamilton* (Boston, 1882), in the "American Statesmen Series"; Sumner, *Alexander Hamilton* (New York, 1890), in the "Makers of America Series"; and a brief sketch by Conant, *Alexander Hamilton* (Boston, 1901), in the "Riverside Biographical Series." A vivid account of Hamilton is contained in Mrs. Gertrude Atherton's historical romance, *The Conqueror* (New York, 1902). Oliver's *Alexander Hamilton: An Essay on American Union* (London, 1906) is a brilliant work, though strongly anti-Jefferson. Consult also: J. H. Choate, *Abraham Lincoln and Other Addresses* (New York, 1910); A. M. Hamilton, *The Intimate Life of Alexander Hamilton* (ib., 1910); F. T. Fox, *A Study in Alexander Hamilton* (ib., 1911); S. W. Culbertson, *Alexander Hamilton* (New Haven, 1911). A list of books concerning Hamilton, and of Hamilton's writings, is given in Ford, *Bibliotheca Hamiltonia* (New York, 1886).

HAMILTON, Andrew (?–1703). A Colonial Governor of New Jersey. He was of Scottish birth, and before emigrating to East Jersey had been a merchant in Edinburgh. In 1686 he was appointed a member of Governor Lord Neill Campbell's council, and a year and a half later, Dec. 10, 1687, on the latter's return to Europe, was appointed his substitute. While on a visit to London in 1692 he was regularly commissioned Governor of East Jersey and soon afterward received the appointment to the same office in West Jersey. In 1697 the proprietors deposed him because of his Scottish birth, in accordance with an act of Parliament passed shortly after Sir George Barclay's attempt to assassinate King William; but in 1699 he was reappointed. In 1701 William Penn appointed him Deputy Governor of Pennsylvania. He was for some time Postmaster-General in America, and either he or his son, Col. John Hamilton, established the first Colonial postal service under a patent dated 1694.

HAMILTON, Andrew (c.1676–1741). An American lawyer, born in Scotland. Of his early history nothing is known, nor is it certain that Hamilton was his real name, as he was for some time called Trent. About 1697 he came to Virginia and afterward removed to Philadelphia, where he was made Attorney-General (1717) and a member of the Provincial Council (1721). He was prothonotary of the Supreme Court and recorder of Philadelphia, a member of Assembly (1727) and its Speaker in 1729. He and his son-in-law built as a private property the State House, which later became Independence Hall. Hamilton is best known for his defense (1735) of John Peter Zenger (q.v.) on the charge of libel. He advanced as defense the truth of the publication and gained a verdict of "not guilty," which did much for the freedom of political discussion, so that Gouverneur Morris styled him "the dog star of the American Revolution." He was trustee of the General Loan Office and (1737) judge of the Vice-Admiralty Court of the Province of Pennsylvania.

HAMILTON, Anthony (1646–1720). An English courtier and French author of fables and of the scandalous *Mémoires du Chevalier de Gramont*, otherwise known as the *Histoire amoureuse de la cour d'Angleterre* (1713). He was born at Roscrea, Ireland, the third son of Sir George Hamilton, a son of the first Earl of Abercorn, and was brought up in France and as a Roman Catholic. This prevented his promotion by Charles II, at whose court he was very popular, but furthered it under James II, who made him colonel of an Irish regiment and Governor of Limerick. After the fall of James he went back to France, where he found a patroness in the Duchess Ludovise of Maine. At her country seat at Sceaux he wrote the famous *Mémoires.* His last public enterprise was a share in the fiasco of the Old Pretender in 1708. Hamilton's *Contes de féerie* aimed at once to rival and to ridicule the *Arabian Nights* of Galland (q.v.). They err through artificiality and the intrusion of personal and local allusions. The *Mémoires de Gramont*, on the other hand, will always remain one of the most remarkable pictures that we possess of the noble younger son, the cadet of the *grand siècle*—light yet hard-hearted, keenly witty, profoundly skeptical, chivalrously brave when in view, capable of dastardly meanness behind the scenes. They give interesting side lights on Mazarin, Cromwell, Charles II, and Louis XIV, as well as on the customs of both France and England. The *Mémoires* were printed in English in 1714. There is an illustrated translation with notes by Walter Scott (1811), and many editions in both languages. The *Fables* were first printed in 1730, and Hamilton's *Works* in six volumes in 1749. Editions after 1812 are more complete. Consult Sainte-Beuve, *Causeries du lundi,* vol. i (Paris, 1857–62).

HAMILTON, Clayton (Meeker) (1881–). An American dramatic critic. Born in Brooklyn, N. Y., he graduated from the Polytechnic Institute of Brooklyn in 1900 and from Columbia University (M.A.) in 1901. He was extension lecturer on the drama at Columbia after 1903, and lectured also in other connections. He served as dramatic critic and associate editor of the *Forum* in 1907–09, and as dramatic editor of the *Bookman* after 1910, of *Everybody's Magazine* after 1911, and of *Vogue* after 1912. He was elected a member of the National Institute of Arts and Letters. He edited Stevenson's *Treasure Island* for "Longman's English Classics" in 1910; contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA; and is author of *The Love That Blinds* (1906) with Grace Isabel Colbron; *Materials and Methods of Fiction* (1908); *The Theory of the Theatre* (1910); *The Stranger at the Inn* (1913); *Studies in Stagecraft* (1914); and, with A. E. Thomas, a play, *The Big Idea* (1914).

HAMILTON, ELIZABETH (1758–1816). An author, of Scottish parentage, born in Belfast. She was educated by relatives in Stirlingshire and began to write at an early age. *Hindoo Rajah* (1796), containing Eastern impressions of England; *Memoirs of Modern Philosophers* (1800); *Letters on Education* (1801–02); *Memoirs of Agrippina, the Wife of Germanicus* (3 vols., 1804); *Letters on the Formation of the Religious and the Moral Principle to the Daughter of a Nobleman* (1806), are her more serious works; but she is best known by her Scottish tale, *The Cottagers of Glenburnie* (1808), and the ballad "My ain Fireside." She was unmarried, but called herself Mrs. Hamilton and was personally revered as a philanthropist.

HAMILTON, EMMA, LADY (?1761–1815). Mistress of Horatio Nelson (q.v.), the famous English admiral. She was a daughter of Henry Lyon, a man in very humble circumstances. Her career was for a long time an obscure one, and she gave birth to several illegitimate children. In 1784 she fell in with Sir William Hamilton, Ambassador at Naples, and he was captivated by her great beauty. She became his mistress, but he married her on Sept. 6, 1791. At Naples she played a great social and political rôle, being an intimate of Queen Maria Carolina. Nelson first met Lady Hamilton at Naples in 1793, again in 1798, and from 1800 onward they lived together. In 1801 Lady Hamilton gave birth to a child, Horatia, by Nelson. After Nelson's death Lady Hamilton's affairs became involved, and in 1813 she was even arrested for debt. She died at Calais, on Jan. 15, 1815. Her child by Nelson lived with the latter's sisters. She died March 6, 1881. Another child by Nelson died in infancy. Consult Sichel, *Emma, Lady Hamilton* (London, 1905), and Moorhouse, *Nelson's Lady Hamilton* (ib., 1906).

HAMILTON, FRANK HASTINGS (1813–86). An American surgeon, born at Wilmington, Vt. He graduated at Union College in 1830 and received the degree of M.D. at the University of Pennsylvania in 1835. After teaching in various colleges, he became in 1861 professor in the Bellevue Hospital Medical College. He was a military surgeon for two years in the Civil War and was appointed medical inspector with the rank of lieutenant colonel in 1863. Among the many positions of honor and trust which he held was the presidency of the New York Society of Medical Jurisprudence. He served as consulting surgeon to various hospitals and asylums and became widely known as an authority on surgery, his three large works having a recognized place in the literature of medical science. They are: *Treatise on Fractures and Dislocations* (1860; 5th ed., 1880); *Practical Treatise on Military Surgery* (1861); *The Principles and Practice of Surgery* (1872).

HAMILTON, FRANKLIN ELMER ELLSWORTH (1866–). An American Methodist Episcopal clergyman and educator, brother of John W. Hamilton. He was born at Pleasant Valley, Ohio; graduated from Harvard College in 1887, and, after being professor of Latin and Greek in Chattanooga University (1887–88), from the Boston University School of Theology in 1892; and studied at Berlin and Paris for nearly three years. He entered the ministry in 1892, joining the New England conference. In 1905–06 he made a trip around the world for the purpose of studying missions. He was a member of the general conferences of 1908 and 1912 and of the ecumenical Methodist conference of 1911. In 1908 he became chancellor of the American University, at Washington, D. C., succeeding Bishop C. C. McCabe. He was president of the Epworth League of New England in 1902–04 and vice president of the Epworth League of the world from 1908 to 1912. He is the author of *The Cup of Fire* (1914).

HAMILTON, GAIL. The pseudonym of Mary Abigail Dodge (q.v.).

HAMILTON, GAVIN (1730–97). A Scottish painter and antiquary. He was born at Lanark, of an ancient Scottish family. At an early age he was sent to Rome, where most of his life was spent. He studied painting under Massuchi and painted chiefly classical subjects. His favorite themes were chosen from the *Iliad*—"Achilles beside the Dead Body of Patroclus," "Hector and Andromache," and "Helen and Paris." Hamilton, however, rendered greater service to art by his discoveries of precious fragments of ancient monuments than by his direct contributions to it. The latter part of his life was devoted to excavations in various parts of the Roman states, but especially on the Via Appia, at Prima Porta, Monte Cagnuolo, Castel di Guido, Gabii, and above all at Hadrian's villa at Tivoli. The statues, busts, and bas-reliefs found by him form the most interesting portion of the Museo Pio-Clementino in the Vatican, after the treasures of the Belvedere. Many collections in England, Germany, and Russia are deeply indebted to his labors. To one of the best of these—the Townley collection (British Museum)—Hamilton contributed a large number of valuable marbles. The Gabii marbles are in the Louvre. As a dealer in the antiquities which he discovered, he was liberal and honest. In 1773 he published at Rome *Schola Italica Picturæ*, illustrated after his own drawings of the great Italian masters.

HAMILTON, GEORGE FRANCIS, LORD (1845–). An English administrator, born at Brighton, the third son of the first Duke of Abercorn. He was educated at Harrow, entered the Rifle Brigade as ensign in 1864, and in 1868 was transferred to the Coldstream Guards, with a lieutenant's commission. In 1868 he entered Parliament as a Conservative for Middlesex, which he represented till 1885. After 1885 he sat for the Ealing division. In 1874–78 he was Undersecretary of State for India. With the return to power of the Conservative party in 1885 he became First Lord of the Admiralty, an office which he occupied until 1892. In 1895 he became Secretary of State for India under Lord Salisbury and retained office under Balfour till 1903, when he resigned owing to his opposition to Mr. Chamberlain's tariff reform proposals. His ability in dealing with Indian affairs was marked. He was chairman of the London School Board in 1894–95, chairman of the Poor-Law Commission in 1905–09, and after 1899 was captain of Deal Castle.

HAMILTON, SIR IAN STANDISH MONTEITH (1853–). A British army officer, born in Corfu, the son of a colonel, of the Silvertonhill branch of the family. He was educated at Cheam and Wellington, and entering the army in 1873, he served with distinction in the Afghan War in 1878–80 and in the Boer War of 1881. In the Nile expedition (1884–85) he received the Khedive's Star, and, as in the Burmese expedition of 1886–87, a medal. He became colonel (1891) and major general during the Boer War (1899–1901), where he fought before Ladysmith, and in 1901 was appointed chief of staff to Kitchener. In 1903–04 he was quartermaster-general. During the Russo-Japanese War he accompanied the Japanese forces in Manchuria as military representative of India. He held the southern command in 1905–09, and (after being adjutant general to the forces and second military member of the army council) in 1910 took the command of the Mediterranean, which Kitchener had refused. He wrote prose and verse with some facility and published in 1905 *A Staff Officer's Scrap-Book during the Russo-Japanese War* (abridged ed., 1913).

HAMILTON, JAMES, first DUKE OF (1606–49). A Scottish nobleman. After the descendants of James VI he was heir to the Scottish throne. He was educated at Exeter College, Cambridge. In 1631 he aided Gustavus Adolphus in Germany with 6000 men, but after heavy losses from disease and famine he returned in 1634 and became an adviser to Charles I. Appointed in 1638 a commissioner to pacify the Scottish covenanters, who had revolted against the new English Prayer Book, he informed the King that his countrymen "were possessed by the devil," and his expedition was futile. He became involved in numerous political intrigues, on one side and then another. In 1641 an attempt was made to seize Argyll, Hamilton, and the Earl of Lanark; but they escaped. He was with the King in 1642 when the effort was made to arrest the five members of Parliament. Charles, who had zealously befriended Hamilton, became dissatisfied with him at last and had him imprisoned (1644) in Pendennis Castle and afterward at St. Michael's Mount, from which he was released by Fairfax's troops in 1646. Two years later, after the seizure of the King, Hamilton raised an army of 24,000 Scots, but he was held in check and later easily defeated in detail at Preston by Cromwell with only 9000 men. Taken prisoner, Hamilton was tried in February, 1649, condemned to death, and executed. Consult G. Burnet, *Memoirs of James and William, Dukes of Hamilton* (London, 1677).

HAMILTON, JAMES (c.1710–83). A Colonial Governor of Pennsylvania, son of Andrew Hamilton (q.v.) the lawyer, and born probably in Accomac County, Va. He was prothonotary of the Supreme Court of Pennsylvania after his father's resignation, was six times a member of the Provincial Assembly, was elected mayor of Philadelphia (1745), and a member of the Provincial Council (1746). Two years later he became Lieutenant Governor, which office he resigned in 1754. He took a prominent part in the defense of the Colonies against the Indians in 1755 and was Deputy Governor (1759–63, 1771, and 1773). While the British held Philadelphia, he was a prisoner on parole. He was active in educational and scientific circles after the war, serving as president of the board of trustees of Philadelphia College and head of the Philosophical Society.

HAMILTON, JAMES (1769–1829). A British teacher of languages. Hamilton went to school for four years only, to two Jesuits in Dublin. As a business man, he lived in France and Hamburg, where he learned German from an émigré, D'Angeli, who used no grammar, but taught by literal translation. On the rupture of the Peace of Amiens, Hamilton was "detained" in France, and his continental business was ruined. In 1815 he came to New York, intending to manufacture potash. Instead, he became a teacher of languages, combining the methods of his Jesuit teachers and of D'Angeli. This analytic method met with almost incredible success in New York City and in Philadelphia, where he published English interlinear translations of works in Greek, Latin, French, Italian, and German. Opposition to his methods in Baltimore College roused him to a defense which resulted in the total desertion by the students of the college to the Hamiltonian Institute, which he had founded in Baltimore. After teaching in many college towns of the United States and in Canada, he went to London (1823). Throughout England and Scotland he was again marvelously successful. Hamilton's great work was *History, Principles, Practice, and Results of the Hamiltonian System* (last ed., 1831).

HAMILTON, JAMES (1786–1857). An American politician, born in Charleston, S. C. He received a good education in his native city, studied law, and soon attained a high position at the South Carolina bar. In 1812 he was appointed a captain in the army and served in the campaigns on the Canadian frontier. He was mayor of Charleston for several terms, and in 1822, while serving in that capacity, he detected, and by his measures suppressed, a well-planned negro conspiracy. After serving in the State Legislature, he was in 1822 elected a member of Congress as a States Rights Democrat, to fill a vacancy, and was twice reëlected, serving until 1829. He was an ardent supporter of Andrew Jackson, both in 1824 and 1828, and after Jackson's election in the latter year he was offered the position of Secretary of War or of Minister to Mexico, both of which he declined. Returning to South Carolina, he was in 1830 elected Governor of the State on an extreme States Rights platform, and immediately recommended to the Legislature that it authorize armed resistance to the enforcement of the provisions of the tariff of 1828. He advised the passage of the Nullification Act, which brought affairs to a crisis, and in 1832 was appointed by Gov. Robert Y. Hayne, who in that year succeeded him in the governorship, to the chief command of the State troops recruited to resist the national government. He never acquiesced in the settlement of the trouble and soon thereafter removed to Texas, where he became interested in some colonization schemes. In 1841 he was the accredited representative of Texas in Europe, where he was active in securing the recognition of the independence of the Republic by England and France in that year. He next bent all his energies to securing the admission of Texas into the Union. In 1857 he was elected United States Senator from Texas, but was drowned in a steamship collision off the Texas coast before he took his seat.

HAMILTON, JAMES (1814–67). A Presbyterian divine. He was born in Paisley, Scotland, Nov. 27, 1814, educated at Glasgow and Edinburgh, entered the ministry, and from 1841 till his death, Nov. 24, 1867, was minister of the National Scotch Church, Regent Square, London. His literary activity was very great, as aside from editorial labor he produced numerous volumes of devotion and biography. His *Collected Works* were published in six volumes (London, 1869–73). His life, by Arnot, is in the *Scottish Ecclesiastical Biographics* (Edinburgh, 1870).

HAMILTON, James Cleland (1836–1907). A Canadian barrister and author. He was born at Belfast, Ireland, but in his youth came to the United States, was educated at Hanover College and Rutgers College, and afterward took a law course in Toronto University. He was called to the Canadian bar in 1861. In addition to his professional duties he devoted considerable time to literary and scientific investigation. His more important work is contained in the papers upon literary and scientific subjects written for the Canadian Institute, of which he was elected vice president, and printed in its *Proceedings*—such as *The Great Centre, an Astronomical Study* and *The Panis, an Historical Outline of Canadian Indian Slavery in the Eighteenth Century.* He published also *The Prairie Province: Sketches of Travel from Lake Ontario to Lake Winnipeg* (1876) and *The Georgian Bay* (1893).

HAMILTON, John Angus Lushington Moore (1874–1913). A British newspaper correspondent, born in London. He studied at Cheltenham College and in Germany and France. He served as a special correspondent in the United States (1894), in Australasia (1896), and in Central Asia (1905–06); and he was war correspondent at the siege of Mafeking (1899–1900), in the Boxer uprising (1900–02), in the Balkans (1903), in the Russo-Japanese War (1904–05), in the Assam operations (1911–12), and in the Balkan War (1913). While serving as correspondent with the Turkish army, he was twice captured by the allies. He attempted to give a lecture tour in the United States in 1913, but, his efforts resulting in failure, he committed suicide. He published: *Siege of Mafeking* (1900); *Korea* (1904); *Afghanistan* (1906); *Problems of the Middle East* (1908); *Somaliland* (1910); *In Abor Jungles* (1912).

HAMILTON, John McLure (1853–). An American portrait painter, born in Philadelphia. He studied first at the Pennsylvania Academy of Fine Arts, then at the Royal Academy of Antwerp, and at the Ecole des Beaux-Arts, Paris. After 1878 he made his home in London, where he established a reputation by his portraits of many noted Englishmen. There is nothing essentially English about his style, which unites French accuracy of line with the warm shadows of the Antwerp school, giving the effect of solid modeling. His portraits are small in size and depict the sitter in familiar surroundings with the intimacy of actual life. He was awarded gold medals at the Pan-American Exposition (Buffalo, 1901) and the St. Louis Exposition (1904). His works in public galleries include “Gladstone at Downing Street,” “The Honorable Richard Vaux,” and “Cardinal Manning,” in the Pennsylvania Academy; “Gladstone,” in the Luxembourg; and “Professor Tyndall,” in the National Portrait Gallery, London.

HAMILTON, John William (1845–). An American Methodist Episcopal bishop, brother of Franklin E. E. Hamilton. He was born at Weston, Va., and graduated from Mount Union College in 1865 and from the Boston School of Theology in 1871, having entered the ministry in 1866. From 1892 to 1900 he was secretary of the Freedmen's Aid and Southern Education Society and at the same time editor of the *Christian Educator.* In 1900 he was elected Bishop, and is now resident in Boston. He was a member of five general conferences and a member of each of the last three ecumenical Methodist conferences. In 1898 he was selected as the fraternal delegate to the Wesleyan conferences of England and Ireland. He is the author of *Jesse Lee and the Old Elm* (1875); *The People's Pulpit* (1884); *American Fraternal Greetings* (1898).

HAMILTON, Mount. See Lick Observatory.

HAMILTON, Patrick (c.1504–28). A precursor of the Scottish Reformation. He was born probably in the year 1504, either at Stanehouse or Kincavel. He was educated at the University of Paris, where he took his degree of A.M. in 1520, after which he probably proceeded to Louvain and Basel. In 1523 he was back in Scotland and was admitted to St. Andrews University. While abroad, he had formed new tastes and interests, but for some time his opinions attracted no attention. Gradually, however, his convictions matured. From agreeing with Erasmus he came to agree with Luther, and about 1526 he appears to have announced his new views in such a manner as to draw the notice of Archbishop Beaton. Early in 1527 Beaton made “inquisition” into the grounds of the rumor against him, and Hamilton fled to Wittenberg, where he became familiar with Luther and Melanchthon, and then passed on to Marburg, where the university was just opened. After six months he returned to his native country, in the autumn of 1527. He repaired to the family mansion at Kincavel and there preached openly. In some way he was induced to go to St. Andrews in January, 1528, and took up his abode in a lodging provided for him by the Archbishop. A conference was held, in which his opponents showed a conciliatory spirit and even to some extent expressed concurrence in his views. He was allowed to depart in peace and for some time to promulgate his sentiments in the city and University of St. Andrews. After a month or so he was summoned to answer before Beaton to a charge of heresy. He was condemned for divers heresies, deprived of all dignities and benefices in the Church, and delivered over to the secular power to be punished. The sentence was carried out without delay. On the very same day on which he was tried (Feb. 29, 1528), he was burned at the stake in the front of the gate of St. Salvador's College. His only publication is known as *Patrick's Places*, and is an evangelical treatise, written in Latin; it was translated by Frith (London, 1807). For his life, consult Lorimer (ib., 1857).

HAMILTON, Robert (1743–1829). A Scottish writer on finance, born in Edinburgh, educated at the University of Edinburgh. He entered a banking house, but at the age of 26 left mercantile pursuits and became successively rector of Perth Academy, professor of natural philosophy in Aberdeen University (1779), and professor of mathematics (1817). In 1777 he wrote an *Introduction to Merchandise;* in 1790, three essays on *Peace and War;* in 1822, *Management of the Poor,* a work displaying enlightened views on economics. His most important work is the *Essay on the National Debt,* which appeared in 1813. A posthumous volume published in 1830, *The Progress of Society*, is also of great ability, treating of economical principles by tracing their natural origin and position in the development of social life.

HAMILTON, Schuyler (1822–1903). An American soldier, a grandson of Alexander Hamilton. He was born in New York, graduated at West Point in 1841, served with great gallantry in the Mexican War, and was brevetted first lieutenant in 1846 and captain in 1847. From the latter year until 1854 he was aid-de-camp to Gen. Winfield Scott. He then resigned from the army, but upon the outbreak of the Civil War volunteered as a private in the Seventh Regiment, New York National Guard. He was rapidly promoted, becoming a brigadier general of volunteers in 1861, and a major general of volunteers in 1862. He was actively engaged in the operations against New Madrid, Mo., and Island No. 10, in the Mississippi River, and in the campaigns in Tennessee and Mississippi. Sickness compelled him to resign in 1863. He was hydrographic engineer in the Department of Docks, New York City, in 1871–73, and superintendent of yards in 1873–75, and subsequently, owing to ill health, lived in retirement. He wrote *A History of our National Flag* (1852).

HAMILTON, Thomas (1789–1842). An English prose writer, of Scottish descent, born in Glasgow. He was educated at Glasgow University and became the friend of Wordsworth and Scott. His novel *Cyril Thornton* (1827) was popular in its day, while in *Men and Manners in America* (1833) he showed himself a kindly critic, shrewd and humorous.

HAMILTON, Walter (1844–99). An English writer, born in London, and educated at the Collège de Dieppe. He was a fellow of the Royal Historical Society, vice president of the Société Française des Collectionneurs d'Ex Libris, and vice president of the Ex Libris Society. His published works include: *A Memoir of George Cruikshank* (1878); *The Origin of the Office of Poet Laureate* (1879); *The Poet Laureates of England* (1879); *The Æsthetic Movement in England* (1882); *Parodies of the Works of English and American Authors, Collected and Annotated* (5 vols., 1884–88); *French Book Plates for Ex Libris Collectors* (1892); *Dated Book Plates* (2 parts, 1894–95).

HAMILTON, William (1704–54). A Scottish poet, born at Bangour, Linlithgowshire. Between 1724 and 1727 he contributed lyrics to Allan Ramsay's *Tea Table Miscellany.* In 1745 he joined the cause of Prince Charles and celebrated the battle of Prestonpans in an ode beginning "As over Gladsmuir's blood-stained field." After the disaster of Culloden he lurked for several months in the Highlands and at length escaped to France; but the influence of his friends at home procured him permission to return to Scotland. Broken in health, he went back to France, where he died. Though Hamilton wrote much graceful verse, his fame rests upon what Wordsworth called "the exquisite ballad," "The Braes of Yarrow."

HAMILTON, Sir William (1730–1803). Grandson of William Douglas, third Duke of Hamilton, born in Scotland. From 1764 to 1800 he was English Envoy Extraordinary and Plenipotentiary to the court of Naples. During his residence there he devoted much time to a study of Vesuvius, Ætna, and other volcanoes, and embodied his results in *Campi Phlegræi* (2 vols., and suppl., Naples, 1776–79) and shorter papers. He called attention also to the earlier excavations and discoveries at Pompeii. He was also an enthusiastic collector, particularly of ancient vases, which he seems to have been one of the first Englishmen to appreciate for their artistic merit. His first collection was sold in 1772 to the British Museum for £8400 and formed the nucleus of the present department of Greek and Roman antiquities. This collection was described by D'Hancarville, in *Antiquités étrusques, grecques et romaines* (4 vols., Naples, 1766–67; 2d ed., Florence, 1801–08). In 1787 he resumed collecting and in 1798 sent a second collection to England for sale; but the vessel was wrecked, and only about two-thirds of the cases were recovered. The whole collection was drawn by Tischbein in his *Collection of Engravings from Greek Vases . . . in the Possession of Sir W. Hamilton* (Naples, 1791 et seq.). From 1793 to 1800 Hamilton took an active part in the diplomacy of the court of Naples; but his health failed, and in 1800 he was recalled. A claim upon the British government for special services was not allowed, but he was granted a pension of £1200. Hamilton's first wife was Miss Barlow, who died in 1782. In 1791 he married his mistress, Emma Lyon, who as Lady Hamilton is prominent in the life of Lord Nelson. See Michaelis, *Die archäologischen Entdeckungen des neunzehnten Jahrhunderts* (Leipzig, 1906).

HAMILTON, Sir William (1788–1856). An eminent philosopher of the Scottish school. He was born March 8, 1788, at Glasgow, where his father, Dr. William Hamilton, and his grandfather, Dr. Thomas Hamilton, held in succession the chairs of anatomy and botany. After gaining distinction, especially in the philosophical classes, at Glasgow, he went in 1807 to Balliol College, Oxford, as a Snell exhibitioner, and made a brilliant record for himself as a student of literature. He left Oxford in 1811, and instead of going into the practice of medicine, which he had studied, he became a member of the Scottish bar in 1813, but seems never to have had any practice in his profession except what became incumbent on him afterward, on being appointed crown solicitor of the Court of Teinds. In 1820, on the death of Dr. Brown, he was an unsuccessful competitor for the chair of moral philosophy in Edinburgh. In the following year, however, Hamilton was appointed to the professorship of history in that university. He took part in 1827 in the discussion of the scientific value of phrenology, and made investigations for himself of the brains of various animals in order to become acquainted at first hand with the facts of the case. In 1829 there appeared in the *Edinburgh Review* a critique of Cousin's *Cours de Philosophie* of the previous year, in which was developed Hamilton's famous doctrine of the infinite. The critique, which was entitled "The Philosophy of the Unconditioned," immediately drew attention to him from philosophers both in Great Britain and on the Continent. For some years after this Hamilton was a regular contributor to the *Edinburgh Review*, writing articles on philosophy, literature, medicine, education, and university reform. Many of these contributions were translated into German, French, and Italian. In 1852 they were all edited by Hamilton himself, with large notes and appendices, under the title of *Discussions in Philosophy and Literature, Education, and Uni-*

versity Reform. In 1836, after a severe contest, Hamilton was elected to the chair of logic and metaphysics in Edinburgh. In 1846 he published in two volumes *The Works of Thomas Reid,* carefully edited with notes and supplementary descriptions, which give satisfactory views of his own philosophy, but are not always fair to Reid. In 1844 he had a stroke of paralysis. He was, however, able, with an assistant, to perform the duties of his class till the close of session 1855–56, when his health suddenly became worse. He died May 6. In logic Hamilton proposed the so-called doctrine of "the quantification of the predicate" in affirmative propositions. In this contention Hamilton may properly be regarded as the forerunner of the algebraic school of logicians. (See LOGIC.) In philosophy he was an exponent of the common-sense Scottish school, but in some respects he went beyond the tradition of the school. Agreeing with Reid that "the root of our nature cannot be a lie," and that "the deliverance of consciousness" must be trusted, he accepted a naïve sort of natural realism, maintaining that we are directly conscious of the existence of external objects in contact with our bodies and of ourselves. And yet knowledge is said to be relative. "To think is to condition." In this doctrine of the relativity of knowledge consists his departure from Scottish traditions, and it led him to maintain in the spirit of Kant that the unconditioned cannot be known. God is an object of faith, not of knowledge.

Philosophy, according to Hamilton, cannot say whether God is absolutely limited or absolutely unlimited. One or the other He must be, for between contradictions there is no compromise; but either characteristic is inconceivable. Again, our conception of causality is nothing positive. It is nothing but the *inability* of the mind to conceive an absolute beginning. So the infinity of space and time is the inability of the mind to conceive a point where space comes to an end or a moment after which time shall be no more. But this inability to think is no test of unreality. Thus, philosophy is only a learned ignorance (*docta ignorantia*), or a well-assured conviction of the limits of our knowledge. His philosophy of relativity was developed by Mansel (q.v.), and in the hands of Herbert Spencer, who gave up "common sense," it changed into agnosticism. Consult: Veitch, *Memoir of Sir William Hamilton* (London, 1869); id., *Hamilton,* in Blackwood's "Philosophical Classics" (Edinburgh, 1879), and *Hamilton, the Man and his Philosophy* (ib., 1883); J. S. Mill, *Examination of Sir William Hamilton's Philosophy* (London, 1878); Martineau, *Reviews and Addresses,* vol. iii (ib., 1891); A. Seth, *Scottish Philosophy* (Edinburgh, 1890); Stirling, *Sir William Hamilton* (London, 1865); Monck, *Sir William Hamilton* (New York, 1881); Seth, *English Philosophies and Schools of Philosophy* (London, 1912). His principal writings are accessible in the four volumes of lectures edited by Mansel and Veitch, reprinted in two volumes (Boston, 1859–60). A college edition of his writings was published in 1855, by O. W. Wight; and an abridgment of his philosophy appeared as *Metaphysics,* under the editorship of Bowen (Cambridge, Mass., 1870).

HAMILTON, WILLIAM GERARD (1729–96). An English statesman. Of Scottish family, but born in London, he passed through Winchester College to Oriel, Oxford, though he did not graduate. He entered as a student at Lincoln's Inn (1744), but left the law for political life, and was a member of Parliament for both English and Irish boroughs. "Single Speech Hamilton" was a misnomer, since Horace Walpole remarked upon the brilliance of his oratory on more than one occasion. Boswell mentions that he also charmed Dr. Johnson by his personality and conversation. He went to Ireland in 1761, as Chief Secretary to the Lord Lieutenant, having Edmund Burke as his own secretary. He was appointed Chancellor of the Irish Exchequer in 1763; and in 1782 he was offered a place in the English cabinet as Secretary for War, but declined. He was so notable a figure in his time that the *Letters of Junius* were ascribed to him, but he was more of a politician than a statesman. He died in London, July 6, 1796. His published writings were collected by Malone under the title of *Parliamentary Logick* (1808).

HAMILTON, SIR WILLIAM ROWAN (1805–65). A Scottish-Irish mathematician, born at Dublin. His father, a solicitor, went to Dublin as a boy. William was remarkable as a child, having a good knowledge of Hebrew at the age of seven, and at 12 having studied not only Latin, Greek, and the leading modern languages of Europe, but also Syriac, Persian, Arabic, Sanskrit, Hindustani, and Malay. This devotion to languages was encouraged by his father because of the opportunities for service in the East India Company. During this same period his mathematical powers began to be manifest, and in his tenth year he entered a contest with the young American calculator (see CALCULATORS, REMARKABLE), Zerah Colburn, who was then visiting Dublin, and, although defeated, made a creditable record. Before he went to Trinity College, Dublin (1823), in his eighteenth year, he had not only mastered Euclid, Newton's *Arithmetica Universalis* and the *Principia,* and Laplace's *Mécanique céleste,* but had discovered an important error in the last-named work and had written an original memoir on osculation of certain curves of double curvature. His career at Trinity was one of remarkable brilliancy. While only a second-year student he read before the Royal Irish Academy a "Memoir on Caustics," which attracted wide attention and led Airy to assert that "it had made a new science of optics." While still an undergraduate (1827), Hamilton was appointed Andrews professor of astronomy and superintendent of the observatory, and soon after became Astronomer Royal for Ireland. He was twice honored with the gold medal of the Royal Society—first for his work on optics, and again for his contributions to dynamics. He was knighted in 1835 and was subsequently made president of the Royal Irish Academy and corresponding member of the Academy of St. Petersburg and of the Académie des Sciences of Paris.

Hamilton is chiefly known for his discovery of quaternions (q.v.). He announced the theory in 1844 and in 1848 began to lecture upon it at Trinity. His *Lectures on Quaternions* (1853) and *Elements of Quaternions* (posthumous, 1866; 2d ed., 1899) were not, however, written in a style to appeal to a large circle of mathematical readers, and it is owing chiefly to the work of Professors Tait and Kelland that the theory has attracted the attention that it merits. Consult Graves, *Life of Sir William Rowan Hamilton* (Dublin, 1882–89).

HAMILTON COLLEGE. An institution of

higher education, situated at Clinton, N. Y. It was founded in 1793 by the Rev. Samuel Kirkland, a Congregational missionary among the Oneida Indians, for the education of the white and Indian population. The erection of a building, of which the corner stone was laid by General Steuben in 1794, was brought to a standstill for lack of funds, and was only completed in 1799 through the untiring efforts of the founder. In that year the school was formally opened, and until 1812 was known as Hamilton Oneida Academy, deriving its name from Alexander Hamilton, one of its benefactors and trustees. In 1812, the necessary $50,000 having been collected, the institution was chartered by the University of the State of New York as Hamilton College. It grew steadily for a while, but during President Davis's administration differences arose between him and the trustees, and the college suffered in consequence. Under President North's administration, however, the institution developed into one of the best-known classical colleges in the United States and has since maintained a national reputation, especially in the departments of rhetoric and oratory. It has made no effort to give "university" or specialized training, but has consistently upheld high scholastic standards. The two courses are the classical and the Latin-scientific, both offering numerous electives. The A.B. degree is not given without Greek. Two prizes are available. The attendance in 1914 was 200, and the faculty numbered 20. At the same time the endowment was $1,100,000, the gross income $70,000, and the value of real estate and collections was estimated at $500,000. The library contains 62,000 volumes. The campus, covering 95 acres, is notable as representing the graduates and college classes in buildings, grounds, and other college improvements. The presidents have been: Azel Backus (1812–16); Henry Davis (1817–33); Sereno Edwards Dwight (1833–35); Joseph Penney (1835–39); Simeon North (1839–57); Samuel Ware Fisher (1858–66); Samuel Gilman Brown (1866–81); Henry Darling (1881–91); Melancthon Stryker (1892–). Consult C. E. Allison, *Historical Sketch of Hamilton College* (Yonkers, N. Y., 1889).

HAMILTON INLET. An indentation of the Labrador coast, North America, 150 miles long, with a maximum breadth of 30 miles (Map: Canada, T 6). It forms the estuary of the Grand, or Hamilton, River (q.v.). From the north it receives the waters of Grand Lake. Melville Lake is a name applied to the inner waters of the estuary.

HAMILTON RIVER. See Grand River.

HAMILTON SERIES. See Devonian System.

HAM'ITES, or **HAMIT'IC.** Designations applied to peoples and languages of the white or Caucasian branch of mankind settled from remotest times in northern and northeastern Africa and the Canary Islands. Both in biological character and in speech, as well as in situation and activities, they are nearest to the Semites. The Hamites are in touch with African tribes south of the Sahara, and mixture with negroes has influenced the type of the population during thousands of years. On the other hand, Hamite culture has extended far from its original province. Much confusion has been created by adopting at the same time a somatological and linguistic basis of classification. The following popular scheme for the eastern Hamites suffers from this difficulty:

1. The ancient Egyptians, the oldest-known people of the white race to develop a high civilization. Their descendants are the Copts, or native Christians, interspersed among the population, and the Fellahin, or peasant class, speaking a Semitic language and practicing a Semitic religion.
2. Farther up the Nile the Nubians, strongly negroid, are mixed with Hamite Bejas.
3. The aboriginal population on the Abyssinian plateau: Agau Hamites.
4. Ethiopian, or Kushitic, Hamites: Somalis, in many tribes; Gallas, one branch of whom, including Shoas and Amharas, extends into Abyssinia; Danakils in Afarland.
5. Masai, in British East Africa, south of the equator and east of the Victoria Nyanza. They are Hamites in language, have dark skin and frizzled hair, and are physically among the most magnificent races.
6. Wahuma, or Watusi, the ruling race in northwestern German Africa, almost identical in speech and biological character with the Gallas. Passing westward from the Egyptian area along the north of Africa, the Berber Hamites, including Tuaregs, Shluhs, and Kabyles, occupy the littoral region and the Sahara. They are the descendants of the oldest-known inhabitants of this territory, who were believed to have been the founders of the Mediterranean race.
7. Tibus, or Tubus, Hamites of the Sahara north of Lake Chad, mixed with negroes. Their speech is of doubtful affiliation.
8. Fulah, or Fulbe, in extreme West Africa, in Futa-tor and Futa Jallon.
9. Guanches, ancient Hamites of the Canaries.

Meinhof has promulgated the revolutionary view that not only Hausa, but even Hottentot, is to be classed with the Hamitic languages. Sapir accepts Meinhof's opinion as very probable for Hausa, but admits at best a bare possibility that Hottentot was once affected by Hamitic influence. This linguist also definitely rejects the inclusion of Fulah in the Hamitic stock and looks upon Masai as possibly (but not yet demonstrably) a member of the family.

Each of the separate peoples here named is described in its proper place. Among the Hamites are tribes that show blond characteristics, but it cannot be decided whether this is due to albinism or to invasion of Teutonic nations. The standard color is dark brunette; the hair is black and curly; the body is over medium height and in some tribes of great stature. The Hamites have in recent years come into especial prominence through their connection with the origin of Mediterranean peoples and early culture, some ethnologists tracing their type into the heart of Europe. Hamitic speech in its three varieties, Egyptian, Ethiopian, and Berber, belongs to the inflected class, near to the Semitic, from which it has been separated for millenniums. The oldest writing in the world is the hieroglyphic inscriptions placed on their monuments by the Hamitic Egyptians. They also were the earliest engineers, machinists, and architects in massive stones. Consult: Sergi, *Africa: Antropologia della stirpe camitica* (Turin, 1897); Stanford, *Africa* (London, 1907); Keane, *Man, Past and Present* (ib., 1899); Meinhof, *Die Sprachen der Hamiten* (Hamburg, 1912); Sapir, in *Current Anthropological Literature*, vol. ii (Lancaster, Pa., 1913).

HAMIT'IC LANGUAGES. See African Languages.

HAM′LET, or **HAMLETH.** See AMLETH.

HAMLET. An opera by Ambroise Thomas (q.v.), first produced in Paris, March 9, 1868; in the United States in 1872 (New York).

HAMLET. 1. The common spotted moray (q.v.). 2. The Bermuda grouper. See GROUPER.

HAMLET. The longest and profoundest of Shakespeare's tragedies, acted before 1602, when it was entered at the Stationers' Register. The first quarto of 1603 was doubtless a pirated and imperfect copy of the original play; and the second quarto of 1604 was taken from a shortened stage version. The drama is included in the folio of 1623. The story of Hamlet appears first in Saxo Grammaticus' *Historia Danica*, adapted by Belleforest about 1560 in his *Histoires tragiques*. The story was used in a lost play of 1589, probably by Kyd, which Shakespeare worked over and subsequently elaborated into the present form. See AMLETH.

HAM′LEY, SIR EDWARD BRUCE (1824–93). An English general and author, son of Vice Admiral William Hamley, born at Bodmin, and educated at Woolwich. He was gazetted to the artillery and sent to Ireland in 1843 and served in Canada in 1844–48. Returning to England, he became a popular contributor to *Fraser's Magazine* in 1849. He was sent to Gibraltar in 1850. In 1854 he was made adjutant, and later became aid, to Sir Richard Dacres and served through the Crimean War. He was appointed professor of military history at Sandhurst in 1859 and occupied the position until 1865. In 1882 he went with Sir Garnet Wolseley to Egypt, fought at Tell-el-Kebir, and was much aggrieved that his division was not recognized, insisting that it had won the day. He was made general in 1890, as a recompense for his ill treatment. Hamley's best-known works are: *The Operations of War Explained and Illustrated* (4th ed., 1878), used as a textbook; *The Story of the Campaign of Sebastopol* (1855); *The War in the Crimea* (1891); *Lady Lee's Widowhood* (1853); and reprints from *Blackwood's Magazine*, with which he was long connected. Consult Shand, *The Life of General Sir Edward Bruce Hamley* (Edinburgh, 1895).

HAM′LIN, ALFRED DWIGHT FOSTER (1855–). An American architect, born at Constantinople, Turkey, the son of Cyrus Hamlin (q.v.). He graduated at Amherst in 1875, studied architecture at Boston and Paris, and after 1883 was engaged chiefly in teaching in the School of Architecture of Columbia University, of which he was director in 1903–1912. Besides many articles in the professional magazines, and contributions on architecture to the NEW INTERNATIONAL ENCYCLOPÆDIA (1902–04; 2d ed., 1914–15), he was the author of *A Textbook of the History of Architecture* (1896) and, in collaboration, of *European and Japanese Gardens* (1902).

HAMLIN, CHARLES SUMNER (1861–). An American lawyer and public official, born in Boston. He graduated from Harvard College in 1883 and from Harvard Law School in 1886, and thereafter practiced law at Boston. Participating in Democratic national politics, he was Assistant Secretary of the Treasury in 1893–97, and was appointed to the same position again in 1913, and in 1914 he was chosen by President Wilson chairman of the new Federal Reserve Board. In 1897 he served as commissioner to Japan, and as commissioner also at conventions between Russia, Japan, and the United States, and between England and the United States. He lectured at Harvard on government in 1902 and 1903; in 1912 was vice president of the Woodrow Wilson College Men's League and president of the Woodrow Wilson League of Massachusetts; and he published, besides pamphlets on statistical and financial subjects, an *Index Digest of Interstate Commerce Laws* (1907).

HAMLIN, CYRUS (1811–1900). An American Congregational missionary and educator, the father of A. D. F. Hamlin. He was born at Waterford, Me., and graduated at Bowdoin College in 1834, and at Bangor Theological Seminary in 1837. In the latter year he went to Constantinople, as a missionary under the direction of the American Board. In 1860 he began the work of establishing Robert College at Constantinople, and succeeded in spite of the strong opposition of the Turkish authorities. He acted as its president until 1876, and then became professor of dogmatic theology in Bangor Seminary. In 1880 he was elected president of Middlebury College, Vermont, which post he retained till 1885. He published *Among the Turks* (1878) and *My Life and Times* (1893).

HAMLIN, HANNIBAL (1809–91). An American political leader, Vice President of the United States in 1861–65. He was born at Paris Hill, Me., and prepared for college at Hebron Academy, but his father's death prevented his taking a college course. After some years spent in running the home farm and a short period as proprietor of a country weekly at Paris, he studied law, was admitted to the bar, and in 1833 began practice at Hampden, Me. His long political career of almost a half century began in 1835 with his election to the lower branch of the Maine Legislature as a Democrat. To this he was a number of times reëlected, and served as its presiding officer in 1837, 1839, and 1840. In the last year he was a Democratic nominee for Congress, but was defeated in the Whig landslide of that year. Two years later he was elected to the Twenty-eighth Congress, and was reëlected to the Twenty-ninth, serving from 1843 to 1847. Early in his congressional career he took a pronounced stand as an antislavery man, opposed the annexation of Texas, and drew particular attention to himself by introducing the famous Wilmot Proviso (q.v.) during the temporary absence of its author, and securing its acceptance by the House by a vote of 115 to 106. In 1848 he was elected to the United States Senate to fill a vacancy caused by the death of Senator Fairfield. In spite of his action in speaking and voting against Clay's compromise measures, he was reëlected for a full term of six years in 1851. Before the completion of this term, however, he had taken an active part in the founding of the Republican party, and resigned his seat in the Senate in 1856 upon being elected by that party Governor of his native State. In 1857, however, he resigned from the governorship to resume his seat in the Senate, to which he had been reëlected, and where he thought he could be of more use to the antislavery cause than in the Governor's chair. He remained in the Senate until after his election, in 1860, as Vice President of the United States on the ticket with Abraham Lincoln. During the Civil War he was a valued adviser of President Lincoln, and the relations between the two were especially intimate. He was again United States Senator, 1869–81, and was Minister to Spain, 1881–83. Consult C. E. Hamlin, *Life and Times of Hannibal Hamlin* (Cambridge, 1899).

HAM′LINE, Leonidas Lent (1797–1865). An American Methodist Episcopal bishop, born in Burlington, Conn. He studied for the ministry, but afterward read law, and practiced in Ohio. In 1830, however, he became a preacher in the Methodist church, in 1836 was chosen assistant editor of the *Western Christian Advocate*, and four years later chief editor of the *Ladies' Repository*. In 1844, when the Methodist church divided on slavery, he was a member of the General Conference, and drew up the plan of separation. He was elected Bishop at that session and served until 1852. Hamline University, Minnesota, was named in his honor. A number of his sermons are given in the *Works of L. L. Hamline, D.D.*, edited by Rev. F. G. Hibbard, D.D. (2 vols., 1869). Consult W. C. Palmer, *Life and Letters of Leonidas L. Hamline, D D.* (New York, 1866).

HAMLINE UNIVERSITY. A coeducational college under the Methodist Episcopal church, located in St. Paul, Minn., at Hamline, midway between the centres of St. Paul and Minneapolis, founded in 1854. It was first located at Red Wing in 1854 until it closed in 1869. It was reopened in Hamline in 1880. It is purely a college of liberal arts and sciences, with an attendance of 400. The college faculty in 1914 consisted of 20. A modern library building with 15,000 volumes and a modern gymnasium, together with several other buildings adapted to classroom and laboratory work, were maintained in 1914. The value of the grounds and buildings was $220,000; endowment about $800,000, and income from all sources, $59,000. The president in 1914 was S. F. Kerfoot, D.D.

HAMM, häm. The capital of a district in the Prussian Province of Westphalia, situated at the confluence of the Ahse with the Lippe, 23 miles northwest of Arnsberg (Map: Germany, B 3). It is surrounded by old ramparts and a moat, and contains a Roman Catholic church dating from 1510, and an old Gymnasium. It is at the junction of several railroad lines, and produces iron and steel goods, wire, machinery, enamel ware, bridge materials, agricultural implements, iron furniture, gloves, flour, liquors, starch, leather, bricks, brushes, baskets, chemicals, lacquer, varnish, lumber, and tin. At Bad Hamm in the vicinity are thermal baths. It was formerly the capital of the County of Mark and a member of the Hanseatic League. Pop., 1900, 31.371: 1910, 43,663.

HAMMACHER, hä′mäg-ẽr, Friedrich (1824–1904). A German politician, born at Essen, and educated at Bonn and at Berlin, where he studied law. He had to leave the government service in 1850 because of his part in the rising of '48, and went into business. He soon became interested in the mining industries of the Rhine District and of Westphalia, and founded at Dortmund a union for mining interests. A member of the Prussian House of Deputies (1864–85), and of the Reichstag from 1869 to 1898, with two interruptions, he was one of the founders and leaders of the National Liberal party; took an especial interest in economic questions, and drew up the declaration of more than 200 deputies, which, in 1878, altered Bismarck's commercial policy. He was one of the promoters of the government system of railroads in Prussia in the following year, and a founder and director of the German Colonial Union. In 1889 he mediated the disagreements between the Rhenish Westphalian miners and mine owners in the coal strike of that year.

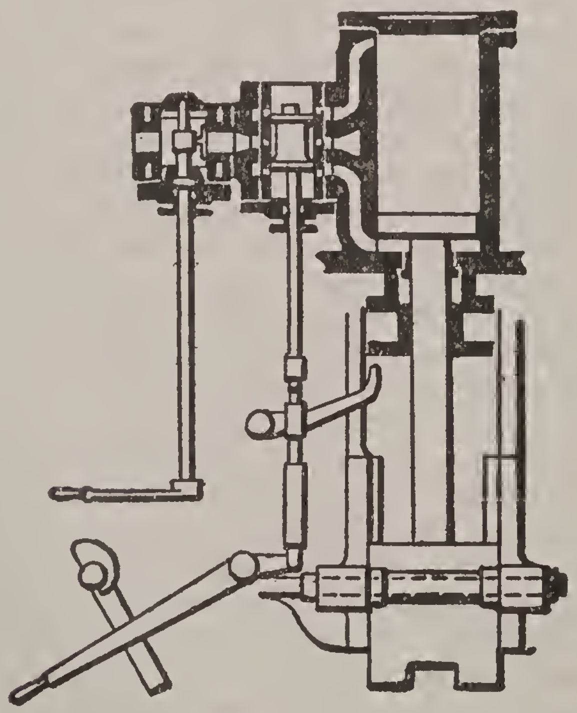
HAMME, häm′me *or* häm. A town in the Province of East Flanders, Belgium, situated on the right bank of the Durme, 13 miles east-northeast of Ghent. It contains grain and oil mills, has manufactures of lace, ribbons, and linen, and carries on trade in flax. Pop., in 1900, 13.755; in 1910, 14,178.

HAM′MER (AS. *hamor*, Icel. *hamarr*, OHG. *hamar*, Ger. *Hammer;* connected with OChurch Slav. *kamy*, Lith. *akmŭ*, stone, Gk. *ἄκμων*, *akmōn*, anvil, Skt. *aśman*, stone). A tool used for applying the force of impact either for the purpose of beating or forging malleable materials into a specific shape, or for driving nails, spikes, wedges, etc. Hammers may be divided into two general classes, viz., hand hammers and power hammers. Hand hammers are made in a variety of forms to suit the particular purposes for which they are employed. They are all made with a steel or iron head set crosswise of a wooden handle. The part of the hammer which strikes the work is called the face, and the opposite part is called the peen. The peen of the ordinary carpenter's hammer is bent, and has a V-shaped notch to permit its use as a lever for drawing nails; that of a geologist's hammer is wedge-shaped, etc. Many hammers have two faces, either of which may be used indifferently. Hammers of large size requiring the use of both hands to wield them are commonly called sledges, and usually have two faces.

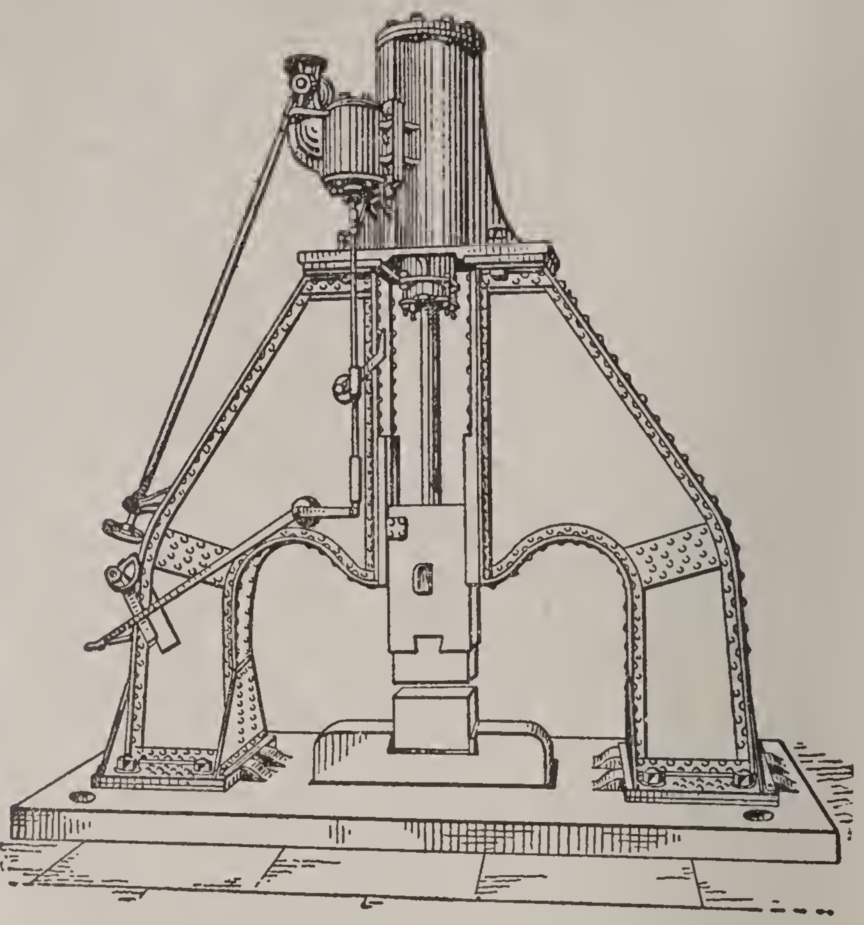
Power hammers are of several forms, the most important of which is the direct-acting steam hammer and its modifications, the drop press and drop hammer. One of the oldest forms of power hammer is the tilt hammer, which consists essentially of a handle working on a horizontal axis at or near one end, and having a head at the other end. The handle and head are usually made of iron, and very heavy. This type of hammer is operated by a cam or eccentric (see Cam; Eccentric), or by a steam cylinder, which swings up the head end one or two feet and lets it drop. An anvil placed so as to receive the blow is an essential part of the mechanism. Various modifications of this simple device have been devised, but, like the original form, they have become practically obsolete in forging operations, having been replaced by the direct-acting steam hammer. This tool was invented by James Nasmyth, who first conceived the invention in 1839, but did not patent it until 1842. Meanwhile a steam hammer had been actually built at the ironworks of Le Creusot, France, the idea of which, according to English writers, had been obtained from Nasmyth's preliminary sketches, to which the French builders had had access. Be this as it may, the fact is that the first Nasmyth hammer was erected at the Bridgewater Foundry at Patricroft, near Manchester, England, in 1843. This hammer consisted of two vertical uprights or columns surmounted by an entablature, which carried an inverted vertical steam cylinder midway between the two columns. In this cylinder was a piston, with a piston rod projecting downward between the two columns and carrying at its end a casting which formed the hammer proper. An anvil block occupied the space between the feet of the columns, and received the blow of the hammer.

To operate the hammer steam was admitted to the cylinder below the piston, which raised it with its attached piston rod and hammer to any height desired, limited by the height of the cylinder; when at the desired height the steam was allowed to escape into the air, and the piston and its attachments fell by gravity. The force of the blow depended upon the weight of the hammer and the height of the fall. The hammer was worked by means of an ordinary slide valve and a long lever, requiring great labor and constant attention in order to give the blow required; so that some contrivance capable of adjustment was necessary in order to have complete command over the power of the blow, and in order that, the instant the blow was struck, the block should rise again, so that not only no loss of time should ensue, but that the heat in the mass of iron on the anvil might not be reduced or carried off by the cold face of the block. The peculiar difficulty of securing a true automatic arrangement will be seen when it is considered that the instant of percussion must vary with almost every blow that is struck; for the piece on the anvil becomes thinner and thinner by each succeeding blow, and in flat bars a blow is first given on the flat side, and then on the edge, the difference in the fall of the hammer in the two cases being oftentimes several inches; and further, that the hammer must be under perfect control at all times.

Nasmyth, after many and protracted trials, failed to produce the motion required, and, as a consequence, the whole hammer scheme was on the point of being abandoned. In this dilemma, and during Nasmyth's absence from the works, his partner, Gaskell, applied to their engineering manager, Robert Wilson, who afterward became managing partner and successor to Nasmyth, to endeavor to solve the problem which had hitherto baffled the skill of Nasmyth. Wilson took the matter in hand, and in little more than a week a mechanism was invented and attached to a hammer upon which former experiments had been made, and was at once found to answer most admirably every condition required. Under the influence of this very beautiful mechanical device every variety of blow could be given—from the gentlest tap to the heaviest blow within the compass of the hammer—and that, too, perfectly self-acting in every respect, the long lever and the hard work before referred to being now entirely banished. By simply altering the position of the tappet lever by means of two screws, a blow of the exact force required could be produced and continued so long as steam was supplied. On Aug. 18, 1843, the first hammer was delivered to the Low Moor Iron Works, near Bradford, Yorkshire, and gave such satisfaction that orders for this remarkable tool began to flow in from all parts of the country. The hammer remained in this condition, with the exception of a few minor details, from 1843 to 1853, when Wilson (who had become connected with the Low Moor Iron Works) invented, patented, and applied to the hammers at Low Moor and elsewhere what is called the "circular balanced valve." He later devised for the steam locomotive a balanced slide valve, in which, by a most ingenious arrangement, the valve is allowed to float, as it were, in an atmosphere of steam pressing equally upon it on every side, entirely doing away with all superincumbent pressure upon the *valve*, no matter what the pressure in the *boiler* may be. The great advantage of this invention will be apparent when it is stated that hammers are now made of such a size that if the valve were not balanced a small steam engine would be required to move it. In June, 1861, Wilson patented and introduced another very important improvement, popularly known as the *double-acting hand-gear motion.* By this arrangement the steam is admitted as before to *raise* the piston, and when it has attained the required elevation, and at the very moment when about to descend, by slightly increasing the travel of the hand lever (more than when working single-acting), the steam is admitted into the cylinder *above* the piston, which accelerates and increases the intensity of the falling blow and the consequent capacity of the hammer so much that a 5-ton hammer is, by this double-action arrangement, increased to at least a 12½ or 15 ton one.



STEAM HAMMER.
Section showing cylinder and valve mechanism.



STEEL HAMMER.
For forging iron and steel.

Since 1861 the chief improvements in steam hammers have been in the nature of mechanical improvements in detail and construction to enable larger hammers to be built. A steam hammer of great size was erected at the Bethlehem Steel Works, South Bethlehem, Pa., in 1889, to be used in forging armor plates and other large steel objects. The steam cylinder was 76 inches in diameter, and had a stroke of 16½ feet, and the weight of the moving parts was 125 tons; the anvil was made up of three 22-inch iron blocks, each weighing 70 tons. This hammer has been torn down and replaced by an hydraulic press. At Perm, Russia, there is a 50-ton hammer; at the Terni Steel Works, in Italy, one of 100 tons; at the Krupp Works at Essen, Germany, one of 50 tons; at Woolwich Arsenal, England, one of 25 tons; and at Le Creusot, France, one of 50 tons. Recently steam hammers have been replaced by hydraulic presses for forging armor plate and similar large forgings, and they are now seldom built in the large sizes stated above. In smaller sizes for making drop forgings (see FORGE, FORGING), and for forging the vast majority of smaller work, they are still extensively used. In some works compressed air is used in place of steam for operating their hammers. For a description of a class of compressed-air-operated hammers for light work, such as driving rivets, calking, etc., see PNEUMATIC TOOLS. The steam hammer doubtless ranks as one of the most important economic inventions of all time.

HAMMER, hä′mẽr, JULIUS (1810–62). A German poet, born in Dresden. He studied law at Leipzig, but in 1834 made the acquaintance of Tieck and Theodor Hell by his play *Das seltsame Frühstück,* and decided to devote himself to literature. It was largely due to him that the Schiller Society was formed at Dresden in 1855. His early fiction is of comparatively small value, only *Einkehr und Umkehr* (1856) deserving mention; and his dramatic attempts met with little success and had not much worth. He is best known for his lyric-didactic poetry: the popular collection of proverbs, *Schau um dich und schau in dich* (1851; 33d ed., 1892); *Zu allen guten Stunden* (1854); *Fester Grund* (1857); *Auf stillen Wegen* (1859); *Lerne, liebe, lebe* (1862), all republished many times. He also published a poetic version of the Psalms, *Die Psalmen der heiligen Schrift* (1861); *Unter dem Halbmond* (1860); and the religious anthology *Leben und Heimat in Gott* (13th ed., 1896). Consult Ende, *Julius Hammer* (Nuremberg, 1872).

HAM′MER, THE. A popular name for Judas Maccabæus.

HAMMER, WILLIAM JOSEPH (1858–). An American electrical engineer, born at Cressona, Schuylkill Co., Pa. He was educated at Newark, N. J., and studied also in various European universities and technical schools. Early an assistant of Thomas A. Edison at Menlo Park, N. J., he was chief engineer of the English Edison Company (1881–82) and of the German Edison Company (1883–84); represented the Edison interests at various expositions; and had charge of the Boston Edison Electric Illuminating Company for one year. He received the John Scott and Elliott Cresson medals from the Franklin Institute, was vice president of the American Institute of Electrical Engineers, and for 10 years was president of the National Conference on Standard Electrical Rules. Besides papers on electrical engineering, he is author of *Radium and Other Radio-active Substances* (1903).

HAMMER AND SCOURGE OF ENGLAND, THE. A popular title for Sir William Wallace.

HAMMER BEAM. A horizontal beam projecting inward from the foot of a main rafter, the inner end supported by a bracket from the wall below; it supports in turn a vertical strut and the foot of a half arch of curved timber which meets its opposite fellow under the centre of a collar beam connecting the rafters. The projecting end of the hammer beam beyond this framing is often carved. The hammer-beam framing is employed in order to dispense with tie beams or rods; it was developed by the English mediæval builders into the most beautiful of all forms of artistic roof carpentry. The finest example is that of Westminster Hall, London (1399–1510).

HAMMERFEST, hȧm′mẽr-fĕst. A seaport of Norway and the most northern town in the world, situated in lat. 70° 40′ 11″ N. and long. 23° 45′ E., on the west shore of the island of Kvalö, in a barren, treeless district (Map: Norway, G 1). The town is built almost entirely of wood. The sun is above the horizon, day and night, from the 13th of May to the 29th of July. Its absence for several months in the winter has led to the extensive introduction of electric lighting, the power being derived from waterfalls. The chief occupations of the people are the production of cod-liver oil, and walrus hunting. There is an excellent and sheltered harbor frequented by shipping from all over Europe, and from it are dispatched the whaling and fishing fleets which work the polar seas. There is an active trade with the Russian port of Archangel, the chief exports being fish and train oil. Pop., 1901, 2298; 1911, 2709.

HAM′MERHEAD′, or **HAM′MERFISH′**. 1. A shark of the genus *Sphyrna*, consisting of four or five species, and constituting a family, Sphyrnidæ, distinguished from all other fishes by the extraordinary form of the head, which in the adults resembles a double-headed hammer, with the eyes at the ends of the lateral extensions. The mouth is below the centre of the head. Some of the species attain a length of 15 feet, and are very voracious. The great hammerhead (*Sphyrna zygæna*) is found in all warm seas, occurring on the coasts of the United States and Europe. These sharks are ovoviviparous, and produce about 40 young at a birth. See Plate of GREAT SHARKS. 2. See HAMMERKOP.

HAMMERHEAD BAT. An extraordinary fruit-eating bat (*Hypsignathus monstrosus*), discovered about 1860 by Du Chaillu in the Gabun region of West Africa. It is about 5 inches long, and has the nose greatly swollen and prolonged, as shown in the illustration of its head on the Plate of BATS. Nothing is known of its habits.

HAMMERICH, hȧm′mĕr-ĭk, MARTIN JOHANNES (1811–81). A Danish linguist and teacher, brother of Peter Frederik Adolf Hammerich, historian and theologian. He studied theology, but early showed interest and marked ability in mythology and philology; received his degree in 1836, was instructor of Sanskrit at Copenhagen from 1841 to 1844, and was head of a Gymnasium at Christianshavn. His important works are: a translation of the *Sakuntala* of Kalidasa (last edition, 1879); *Om Ragnarök-*

smythen (1836); *Bidrag til en Skildring af Holberg* (1858); *Ewalds Levned* (1860); *Danmark-Norges Litteratur i kort Overblik* (1864); *Thorvaldsen og hans kunst* (1870).

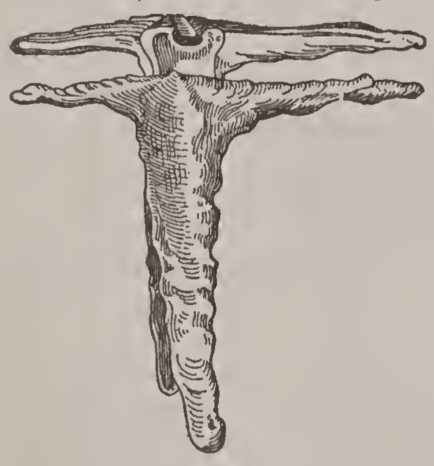
HAMMERKOP, hȧm′ẽr-kôp′. The Dutch name in South Africa for a bird, the umbrette (q.v.), Anglicized as "hammerhead."

HAMMER OF HERETICS. A title applied to St. Augustine; also to Pierre d'Arlly, president of the Council of Constance (1414–18).

HAMMER OF THE SCOTCH, The. A popular name for Edward I of England. It appears on his tombstone in Westminster Abbey.

HAMMER-PURGSTALL, hä′mẽr-pụrᴋ′shtȧl, Joseph Baron (1774–1856). An Austrian historian and Orientalist, born at Graz. He studied in the Oriental Academy of Vienna, took part in the publication of an Arabic-Persian-Turkish lexicon, and was appointed interpreter to the Internuncio at the Porte in 1799 and took part in the expedition under Sidney Smith against the French. He continued in the Austrian diplomatic service until 1817, when he was made Aulic Councilor. In 1847–49 he was president of the newly established Academy of Sciences of Vienna. Meanwhile he wrote constantly on many subjects connected with the history and literature of the Orient. He translated from the Arabic, Persian, and Turkish works previously unknown in Europe. One of his most important contributions was the *Litteraturgeschichte der Araber* (7 vols., 1850–56), and one of his best known, the *Diwan des Hafiz* (1813). He also wrote the *Geschichte der Assassinen* (1818; Eng. trans. by Wood, London, 1835); *Geschichte der osmanischen Dichtkunst* (1836–37); *Geschichte des osmanischen Reiches* (2d ed., 4 vols., 1840); *Geschichte der Goldenen Horde in Kiptschak* (1840); *Geschichte der schönen Redekünste Persiens* (1818); *Leben des Kardinals Khlesl* (4 vols., 1847–51); *Porträtgalerie des steiermärkischen Adels* (1855); etc. Consult Schlottmann, *Joseph von Hammer, ein kritischer Beitrag* (Zurich, 1857).

HAMMER SHELL. An Oriental bivavle mollusk, of the wingshell family (Aviculidæ) and genus *Malleus*, remarkable for the T shape of its shells, which are expanded along the hinge margin. It is also called "hammer oyster," and the flesh is eaten.



HAMMER SHELL.

HAM′MERSMITH. A metropolitan borough of London, England, on the left bank of the Thames, 6 miles west-southwest of St. Paul's; formerly a suburban village with large nursery and market-gardening interests (Map: London, E 5). Hammersmith mainly consists of rows of residential streets occupied by the lower middle and poorer classes, though here and there there are aristocratic and artistic colonies. Schools are numerous. St. Paul's School, founded as an adjunct to St. Paul's Cathedral in 1509, moved to Hammersmith in 1883, and now ranks as one of the chief English public schools. There are many Roman Catholic religious houses, chief among which is Nazareth House, while in the north of the borough is the great Roman Catholic cemetery of Kensal Green. William Morris, the poet and craftsman, lived here for the greater part of his life. Pop., 1901, 112,245; 1911, 121,521.

HAMMERSTEIN, hăm′ẽr-stīn, Oscar (1847–). An American operatic impresario, born in Berlin, Germany. As a lad of 16 he came to America and after a checkered career as cigar maker, inventor, and playwright he drifted in 1870 into the theatrical business as lessee and manager of the old Stadt Theatre in New York, thereby laying the foundation for his subsequent considerable fortune. In 1888 he built his first theatre, the Harlem Opera House, in New York, which was followed in rapid succession by several other playhouses, of which the New York Theatre (originally opened as the Olympia), the Belasco, and the Victoria (vaudeville) were particularly successful places of amusement in New York. In 1906 he opened the Manhattan Opera House, which he had planned for the production of opera in English at popular prices. But before the building was completed he changed his plans and opened the theatre with a grand-opera company of artists of the first rank in open rivalry with the long-established Metropolitan Opera House. As sole manager of this hazardous undertaking he displayed a shrewdness, courage, and enterprise nothing short of genius. It was he who placed French opera in America upon a firm footing. The spirit of rivalry brought about a vast improvement in all the departments of the Metropolitan company, and became a powerful stimulus for the production of novelties at both houses. Artists' salaries soared to fabulous heights. At the end of the fourth season Hammerstein was at the end of his resources, and sold his interests to his rival for the sum of $2,000,000 (1910), agreeing at the same time not to enter the field of grand opera for 10 years in any territory controlled by the Metropolitan interests.

While managing the Manhattan Opera House Hammerstein yet found time to build and open the Philadelphia Opera House in 1908, which, however, he sold early in 1910. Then he transferred his field of operations to London, where, in 1911, he opened the London Opera House, which he conducted along the same lines as formerly the Manhattan. But the English capital showed very little interest in French opera, and at the end of a disastrous season he abandoned the project. In spite of his agreement with the Metropolitan company he built in 1912 the American Opera House in New York. He had already signed contracts with artists for a new grand-opera company and announced the opening date, when the courts intervened, compelling him to abide by his agreement with the Metropolitan. Consequently, when the new house was opened in 1914, it was an ordinary theatre under the name "Lexington Theatre." For details of the operatic war, consult the New International Year Book for the years 1907–14 under title "Music."

HAM′MOCK (a word probably of Indian origin, also spelled *hamak* and *hommock;* confused by some nineteenth-century writers and printers with *hummock*, dim. of *hump*). A localized area characterized by the type of vegetation peculiar to the coastal plain of the southeastern United States, and more common in Florida than elsewhere. In general a hammock is a comparatively dense forest composed mostly of trees other than pines, not subject to inundation (and thus distinguished from a swamp), in a region where open pine forests or prairies predominate. In Florida hammocks are sometimes classed as high and low, according to their topographic position and the amount of moisture in the soil; or light and heavy according to the stand of vegetation and the texture of the soil. The soil may be either sand or clay, or underlaid by marl ("marl hammock"), shells ("shell hammock"), or limestone, but it is always covered with more or less humus, which accumulates in the shade of the trees. The formation of humus in the surrounding pine forests is prevented by frequent ground fires; but the hammocks are usually protected from fire on one or more sides by streams or other topographic features.

The trees in hammocks include both evergreen and deciduous species. In southern Georgia and northern Florida some of the commonest ones are water oak (*Quercus laurifolia*), magnolia (*Magnolia grandiflora*), holly (*Ilex opaca*), dogwood (*Cornus florida*), spruce pine (*Pinus glabra*), loblolly pine (*Pinus tæda*), red bay (*Persea*), hickory (*Hicoria glabra*), hop hornbeam (*Ostrya*), beech (*Fagus*), and sugar maple (*Acer floridanum*). But in extreme southern Florida the hammock trees are nearly all West Indian broad-leaved evergreens, unknown farther north.

Hammock land is considered the most fertile in Florida, and the oldest settlements in that State, other than seaports, are located in or near hammocks. For further information, consult almost any descriptive work on Florida; also Harper, in *Science*, Sept. 29, 1905 (New York); the third and fourth annual reports of the Florida Geological Survey (1910 and 1911); and *United States Bureau of Soils, Soil Survey of the Ocala Area, Florida* (Washington, 1912).

HAMMOCK. The apparatus in which a sailor slings his bed derives its name through the Spanish *hamaca*, from a Peruvian word, the custom of thus suspending a bed having been derived from Peru, where the natives fasten the two ends of a piece of canvas, or of a netting of grass twist, to the branches of a tree. A sailor's hammock consists of a rectangular piece of hempen or cotton canvas, about 6 feet long and 3 in width, gathered together at each end by means of cords and a clew, and hung to hooks under the deck. The hammock thus suspended forms a sort of bag capable of containing the sailor's mattress, his blankets, and himself, as soon as he has acquired the far from easy knack of climbing into it. The hammocks are taken below at sunset and hung in rows about 2 feet apart, in the men's portion of the ship. When done with in the morning the bedding is carefully tied up within each, and the whole stowed in the *hammock netting*, which is no longer a netting, but is a locker or box-shaped receptacle, and is generally in the bulwarks of the waist or below decks.

HAM'MOND. A city in Lake Co., Ind., 21 miles south by east of Chicago, Ill.; on the Grand Calumet River, and on the Erie, the Michigan Central, the Pennsylvania Company, the Chesapeake and Ohio of Indiana, the Pere Marquette, the Wabash, and several other railroads (Map: Indiana, B 1). With its exceptional railroad facilities, the city is of considerable importance as a commercial and manufacturing centre. The industries include extensive chemical works, a bookbindery, woolen mills, foundries, a distillery, starch works, brickyards, and manufactories of beds, lounges, mattresses, railway equipment, agricultural machinery, glue, pianos, and surgical instruments. The city contains a Carnegie library, St. Margaret's Hospital, fine courthouse and Federal buildings, and four large parks. Settled in 1869, Hammond was incorporated in 1883, the charter of that date being still in operation. The government is vested in a mayor, chosen every four years, and a city council, which elects administrative officials. The water works are owned by the municipality. Pop., 1890, 5428; 1900, 12,376; 1910, 20,925; 1914 (U. S. est.), 24,481.

HAMMOND. A city in Tangipahoa Parish, La., 52 miles north-northwest of New Orleans, on the Illinois Central and the Yazoo and Mississippi Valley railroads (Map: Louisiana, H 5). It is in an agricultural and fruit-growing region, ships large quantities of milk and strawberries, and has two saw mills. Hammond adopted the commission form of government in 1913. Pop., 1900, 1511; 1910, 2942.

HAMMOND, ANTHONY (1668–1738). An English literary parliamentarian. He was born in Huntingdonshire, for which he was elected a member of Parliament in 1695. As a fluent and well-informed speaker on financial questions, he soon gained a considerable reputation, but his lack of tact stood in his way. He was twice chosen as member for Cambridge University, and in 1701 was appointed a commissioner for stating the public accounts. The following year he was made a commissioner of the navy, under Godolphin's administration. After another term as member of Parliament he went in 1711 to Spain as paymaster of the British forces there, but soon retired and devoted himself to literary pursuits. In 1720 he edited a *New Miscellany of Original Poems, Translations, and Imitations*, and he also published several pamphlets on political and financial subjects.

HAMMOND, EDWARD PAYSON (1831–1910). An American evangelist. He was born at Ellington, Conn.; graduated at Williams College in 1858, and studied theology at Union Theological Seminary, New York, and at the Free Church Seminary, Edinburgh. After being ordained to the Presbyterian ministry in 1862, he engaged in evangelistic work in the United States, Canada, and Great Britain, and was specially interested in work for the young. He wrote many tracts and small books, and a number of hymns for use in his work. His work is described by Headley, in *Harvest Work of the Holy Spirit* (Boston, 1884).

HAMMOND, HENRY (1605–60). A learned English divine and controversial writer, born at Chertsey, Surrey. He was educated at Magdalen College, Oxford, in 1629 became rector of Penshurst, and in 1643 Archdeacon of Chichester. His devotion to Charles I cost him the living; nevertheless he continued to act as chaplain to the King until 1647, when all the royal attendants were dismissed. After that he was subdean of Christ Church, Oxford, but was soon imprisoned, for 10 weeks, and spent the rest of his life in Worcestershire. His separate works numbered 58, the most celebrated of which are the *Practical Catechism* (1644) and *Paraphrase and Annotations on the New Testament* (1653). His *Miscellaneous Theological Works* were published in the "Library of Anglo-Catholic Theology" (1847–50). His *Life*, by Fell, Bishop of Oxford (London, 1661), is a charming biography. It is reprinted in Wordsworth's *Ecclesiastical Biography*, vol. v (2d ed., 1818).

HAMMOND, Jabez D. (1778–1855). An American author and politician, born in New Bedford, Mass. He practiced medicine in Vermont, but afterward studied law and followed that profession at Cherry Valley, N. Y. He was a Democratic Congressman from New York in 1815–17, a State Senator in 1817–21, and in 1825 was made a commissioner in the settlement of the claims of New York against the Federal government. In 1838 he was elected county judge at Albany, where he had lived since 1822, and he was one of the regents of New York University from 1845 until his death. His published works include: *The Political History of New York to December, 1840* (2 vols., 1843); *Life and Opinions of Julius Melbourn* (1847); *Life of Silas Wright* (1848).

HAMMOND, James Bartlett (1839–1913). An American typewriter inventor. He was born in Boston, graduated from the University of Vermont in 1861 and, after serving in the Civil War as a newspaper correspondent, from Union Theological Seminary; and he studied also in Germany. Turning his attention to mechanical improvements, in 1880 he invented one of the first typewriting machines that was built on scientific principles and with a true alignment. In 1884 his typewriter was placed on the market, and its manufacture netted him a large fortune.

HAMMOND, James Henry (1807–64). An American politician. He was born in Newberry District, S. C., graduated at South Carolina College in 1825, and was admitted to the bar in 1827. In 1830 he became editor of the *Southern Times*, published at Columbia, S. C. He was a Representative from South Carolina in the Twenty-fourth Congress until Oct. 30, 1836, when he resigned. He was Governor of South Carolina in 1842–44, and was a member of the United States Senate in 1858–60. Both as an editor and as a member of Congress he was a vigorous exponent of nullification and States' rights, and a defender of the institution of slavery. Several letters written by him in defense of slavery, as a reply in part to an antislavery circular by Clarkson, were published, with various essays advocating the same view, in a volume entitled *The Pro-Slavery Argument* (1853).

HAMMOND, John Hays (1855–). An American mining engineer, born in San Francisco. He graduated at Sheffield Scientific School (Yale) in 1876, and after a course at the mining school at Freiberg, Germany, he was appointed mining expert on the United States Geological Survey and Mineral Census for the examination of California gold fields. In 1882 he became superintendent of silver mines at Sonora, Mexico. Afterward he was consulting engineer to a mining company at Grass Valley, Cal.; to an iron company in San Francisco; to the Southern and Union Pacific railway companies; to the various mining companies operated by a London firm in South Africa (appointed 1893); to the British South Africa Company, known as the Chartered Company; to the Consolidated Gold Fields Company; and to other organizations of promoters acting in South Africa. He was connected with the Jameson raid (see Jameson, Leander Starr), was tried for complicity in the revolt against the South African Republic, and was sentenced to death. This sentence was, however, commuted to 15 years' imprisonment, and later Hammond was released by the Boer authorities upon the payment of a fine of $125,000. Afterward he was for a time in London, and finally he returned to the United States. He became largely interested in important mining interests in this country and in Mexico, and also in various hydroelectric enterprises, irrigation projects, etc. He lectured at Columbia, Harvard, Yale, and Johns Hopkins universities, and in 1907 was elected president of the American Institute of Mining Engineers. In 1910 he was the special representative of President Taft at the coronation of King George V.

HAMMOND, Robert (1621–54). A soldier in the English Civil War. He was born in Surrey, was educated at Oxford, and in 1643 was appointed captain in one of the cavalry regiments of the Parliamentary forces which were then being organized. He was made colonel of an infantry regiment in 1645. He was present at the battle of Naseby, and at the capture of Bristol and of Dartmouth. In the struggle which soon afterward began between the army and Parliament, Hammond at first sided with the former, but his scruples finally compelled him to change his mind, and he resigned from military service, accepting the appointment of Governor of the Isle of Wight. King Charles I, believing that he would be befriended by Hammond, threw himself upon the latter's protection; but Parliament ordered the King to be kept in custody, a duty which the Governor performed from Nov. 13, 1647, to Nov. 29, 1648. In 1654 Hammond was appointed by Cromwell a member of the Irish Council, but he died in Dublin shortly after his arrival.

HAMMOND, Samuel (1757–1842). An American Revolutionary soldier. He was born in Richmond Co., Va., and as a youth took part in Indian warfare. In the Revolution he participated in the battles of King's Mountain, Cowpens, and Eutaw Springs. In 1803–05 he was a member of Congress from Georgia; from 1805 to 1824 was military and civil Governor of Upper Louisiana; and from 1831 to 1835 was Secretary of the State of South Carolina.

HAMMOND, William Alexander (1828–1900). An American neurologist, born in Annapolis, Md. He graduated in medicine at New York University in 1848; was assistant surgeon in the United States army from 1848 to 1850, and surgeon from 1850 to 1860; professor of anatomy and physiology in Maryland University from 1860 to 1861; and again surgeon in the United States army from the outbreak of the rebellion in 1861. He was surgeon-general of the army, with the rank of brigadier general, from 1862 to 1864, when he was dismissed from the service upon the charge of official corruption after trial by court-martial. In 1878 President Hayes, under authorization of Congress, reviewed the findings of the court-martial, following which action Dr. Hammond was restored to his rank and placed on the retired list as a brigadier general. He was professor of mental and nervous diseases in Bellevue Hospital Medical College from 1867 to 1873, and occupied the corresponding chair in New York University from 1873 to 1882. In 1882 he became a founder of the New York Postgraduate Medical School, in which he was professor of mental and nervous diseases till his death. He established the *Quarterly Journal of Psychological Medicine* *and Medical Jurisprudence* and was a founder of the New York *Medical Journal.* Among his works are: *Physiological Memoirs* (1863); *Military Hygiene* (1863); *On Wakefulness* (1866); *Insanity in its Medico-Legal Relations* (1866); *Sleep and its Nervous Derangements* (1869); *The Physics and Physiology of Spiritualism* (1871); *Diseases of the Nervous System* (1871); *Insanity in its Relations to Crime* (1873); *Cerebral Hyperœmia* (1895); *Treatise on Insanity* (2d ed., 1883), and several novels.

HAM'MONTON. A town in Atlantic Co., N. J., 31 miles southwest of Philadelphia, Pa., on the Atlantic City and the West Jersey and Seashore railroads (Map: New Jersey, C 4). It is in a great fruit and poultry region; and its manufactures consist of shoes, cut-glass ware, domestic wines, underwear, hosiery, macaroni, optical instruments, etc. The water works and sewage system are owned by the town. Pop., 1900, 3481; 1910, 5088.

HAMMURAPI, hàm'ụ-rä'pḗ, King of Babylonia (2124–2081 B.C.). He was the sixth ruler of the so-called first dynasty of Babylon, founded by the Amoritish chief Sumuabu (2232–2217), and a son of Sinmuballit (2149–2124). In the beginning of his reign he probably recognized the suzerainty of the Elamitish King, Kudur Mabuk, and it is possible, though it cannot be strictly proved, that he accompanied another Elamitish king, Kudur Lagamar (see CHEDORLAOMER), on a raid into Syria, as is suggested by Gen. xiv. 1 ff. (See AMRAPHEL.) If the identification is correct, and the notice reliable, this event, in which Rim Sin of Larsa (see ARIOCH) also participated, is likely to have occurred c.2100 B.C., after the conquests of Mesopotamian cities which occupied the King during the first half of his reign. In 2094 he conquered Rim Sin, took possession of Emutbal, and made himself independent of Elam. He seems to have forced his suzerainty on Assyria, whose ruler Samsi Adad I apparently was dependent on him, and whose great cities, Assur and Nineveh, he mentions as belonging to his realm. Beyond Ematbul he does not seem to have possessed any part of Elamitish territory; and whether the title "adda Martu" shows that he held control of Syria is doubtful. It is as an organizer of his Empire that he became particularly famous. In his inscriptions he records the building of canals, the construction of a granary for the storing of wheat against times of famine, and numerous building enterprises in Babylon and other cities. The correspondence between the King and a high official, Sin-idinam, Governor of the Sumerian South, with the cities of Larsa, Ur, Uruk, and Lagash, which has been compared to that between Trajan and Pliny the Younger, throws a vivid light on the organization of the Empire. The King takes a personal interest in the administration of justice, the condition of the standing army, the development of the financial resources, the welfare of all classes of the population. He prides himself on being "the king of righteousness." To secure justice and prosperity he undertook an extensive codification of the law (see HAMMURAPI, CODE OF), and reorganized the judiciary so as to transfer the judicial functions from the priesthood to the "elders" in the cities presided over by the governors of these cities, and to courts whose members were appointed for life by the King, from whose decisions appeal was possible to a supreme court in Babylon and the King himself. The social life of Babylonia in the time of Hammurapi is more intimately known than that of any other period of its history. The determinative for god is sometimes used in connection with the King's name, but that may be due to the first part of it ('Ammu, or Hammu) being, rightly or wrongly, understood to be the name of a god; for from the time of this Amoritish dynasty the kings of Babylonia regarded themselves as the servants of the gods, but not as gods themselves, as their predecessors had done; the meaning of the second part of the name, known to be *rapi,* and not *rabi,* is uncertain. Hammurapi wrote his law in the Akkadian language that it might be understood by all, but also many bilingual inscriptions, in Sumerian and Akkadian. He was one of the greatest and noblest of all the kings that reigned in Babylonia. Consult: Winckler, *Geschichte Babyloniens und Assyriens* (Leipzig, 1892); Maspero, *Histoire ancienne* (Paris, 1897); Rogers, *A History of Babylonia and Assyria* (New York, 1900); King, *Letters and Inscriptions of Hammurabi* (3 vols., London, 1898–1900); id., *A History of Sumer and Akkad* (ib., 1910); Thureau-Dangin, *Die Sumerischen und Akkadischen Königsinschriften* (Leipzig, 1907); Ed. Meyer, *Geschichte des Altertums* (3d ed., Stuttgart, 1913).

HAMMURAPI, CODE OF. On a block of black diorite, nearly 8 feet high, broken into three pieces, discovered by De Morgan on the acropolis of Susa in December, 1901, and January, 1902, the Law of Hammurapi is engraved. Under a bas-relief exhibiting the King receiving this code from Shamash, the sun god, there are 16 columns of text, four and one-half of which form the prologue. These are on the obverse, where there originally were five more columns. On the reverse there are 28 columns, the last five of which form the epilogue. The stone was probably brought to Susa by Shutruk-Nachunte in the twelfth century B.C. A fragment of another copy has subsequently been found at Susa; and other fragments have been found on tablets in Asurbanipal's library and in Babylonia. The code contains 282 paragraphs. These are in the main arranged under two heads, dealing respectively with property and person, each having three subheads, and each subhead still smaller divisions. It begins with directions concerning legal procedure, penalties for unjust accusations and false testimonies as well as for unjust judges, and decision by ordeal in the case of witchcraft. Then follow laws concerning property rights, duties and possession of soldiers and other landowners, loans, deposits, and debts, and a large number of paragraphs dealing with domestic property and family rights. After this come laws in reference to torts, where the *lex talionis* is literally applied, and penalties affixed in proportion to the social position of the injured. Cognizance is taken of injuries done by careless and unsuccessful operations by physicians, and damage occasioned by neglect in various trades. Fixed rates are determined for various forms of service, this rate legislation affecting most branches of trade and commerce. The law is throughout a civil code; there is no religious legislation. This is one of the most striking features of the code. The civil rights of priestesses and devotees are often mentioned, but there is no reference to their religious duties. The law reflects a somewhat advanced economic condition, and seeks to protect the weak, the poor, the widow, and the orphan against injustice from the rich and the powerful. Woman's position is relatively high, as is indicated by her right to own and dispose of property, her right to divorce her husband on grounds deemed sufficient, and the practical monogamy modified only by concubinage under definite restrictions that prevails. There is a curious mixture of barbarous punishments and humane regulations. An eye is gouged out for an eye that is destroyed, theft is punished with death, and a priestess who enters a saloon is thrown into the water; but the wronged wife has redress, the son cannot be disowned unless he repeats the offense against his father, and the slave for debt must be released in the fourth year. No attempt is apparently made to go behind the overt act, to search for motives, or to consider the peculiarities of the individual case. But the law as a whole compares very favorably with the corresponding parts of the Mosaic codes, and is distinctly in advance of most codes in antiquity known to us. As it is many centuries older than the earliest of the Hebrew codes, according to any reckoning of their date, it has been suggested that the latter have been influenced by the former. Such an influence can scarcely have been direct; but the impact of Babylonian legal principles on the Amorites in Syria is quite probable, and the common law of Palestine, not less than the time-honored customs of the invaders, is likely to be reflected in Hebrew legislation. (See PENTATEUCH.) It is now known that Hammurapi was not the first to codify Babylonian law. Already the Sumerian ruler of Lagash, Urukagina, and others had long before his time written down collections of laws. How much in the code is due to Hammurapi's own conception of justice or to the principles prevailing among the Amorites of Babylonia, and how much only repeats earlier Sumerian or Akkadian enactments, cannot yet be determined. Consult: Scheil, *Mémoires de la délegation en Perse* (Paris, 1902), where the code was first published; R. F. Harper, *The Code of Hammurabi* (Chicago, 1904); Winckler, *Die Gesetze Hammurabis in Umschrift und Uebersetzung* (Leipzig, 1904); D. H. Müller, *Die Gesetze Hammurabis und die Mosaische Gesetzgebung* (Vienna, 1903); Johns, *Babylonian and Assyrian Laws, Contracts, and Letters* (Edinburgh, 1904); Kohler and Peiser, *Hammurabis Gesetz* (Leipzig, 1904); Ungnad, *Keilschrifttexte der Gesetze Hammurapis* (ib., 1909); id., in Grossmann, *Texte und Bilder* (Tübingen, 1909); Kohler and Ungnad, *Hammurabi's Gesetz* (Leipzig, 1909–11); Joh. Jeremias, *Moses und Hammurabi* (2d ed., ib., 1903); Oettli, *Das Gesetz Hammurabis und die Thora Israels* (ib., 1903); Davies, *The Codes of Hammurabi and Moses* (Cincinnati, 1905); S. A. Cook, *The Laws of Moses and the Code of Hammurabi* (London, 1903); Lyon, "The Structure of the Hammurabi Code," in *Journal of the American Oriental Society*, vol. xxv (Boston, 1904); id., "The Consecrated Women of the Hammurabi Code," in *Studies in the History of Religions, Presented to Crawford Howell Toy* (New York, 1912); Rogers, *Cuneiform Parallels to the Old Testament* (ib., 1912); Ed. Meyer, *Geschichte des Altertums* (3d ed., vols. i–ii, Stuttgart, 1913).

HAMON, å'môN', JEAN LOUIS (1821–74). A French genre painter. He was born at St. Loup, near Plouha, in northern Brittany, and was educated for the priesthood, but his artistic temperament carried him to Paris, where he studied painting with Delaroche and Gleyre. He first exhibited the "Tomb of Christ" (Marseilles Museum) in the Salon of 1848. In 1849 he found employment in the porcelain manufactory at Sèvres, in which work he was very successful. His enameled casket, exhibited at the London Exposition of 1851, received a medal. His "Human Comedy" (1852, Louvre), and the celebrated "Ma sœur n'y est pas" (My Sister is not at Home) made his reputation; the latter was purchased by Napoleon III. In 1855 he received the ribbon of the Legion of Honor. In 1862 he went to Rome, and in 1865 established himself at Capri. The last years of his life were spent at St. Raphael (Provence), on the Mediterranean. Hamon belonged to the "Neo-grec" group of painters, whose art is the logical development of that of Ingres and Gleyre, and represents modern ideas in a classical garb. It is delicate and graceful in execution, but without real life. Consult La Fenestre, "Hamon," in *L'Art*, vol. ii (Paris, 1875).

HAMPDEN, hăm'den, HENRY BOUVERIE WILLIAM BRAND, first VISCOUNT (1812–92). A British politician. Entering Parliament in 1852, he became a leader of the Liberal party, and from 1872 to 1884 was Speaker of the House of Commons. To overcome the Irish Nationalists' obstructionist tactics, in 1881 he refused further debate on Forster's Coercion Bill, and this led to the closure rule in parliamentary proceedings. In 1884 he was created Viscount Hampden and in 1890 became Baron Dacre.

HAMPDEN, JOHN (1594–1643). An English statesman. He was born in 1594, the eldest son of William Hampden, of Great Hampden, Buckinghamshire, and Elizabeth, daughter of Sir Henry Cromwell, of Hinchingbrooke, Huntingdonshire, aunt of Oliver Cromwell. In 1610 he was entered a gentleman commoner at Magdalen College, Oxford, and in 1613 was admitted to the Inner Temple, where he made considerable progress in the study of law. On Jan. 30, 1621, he first entered the House of Commons as a member for Grampound. He attached himself to the party of St. John, Selden, Coke, Pym, and those who opposed the arbitrary encroachments of the crown; but at first took no very forward part in public business and spoke but seldom. In the first three parliaments of Charles I he sat for Wendover. In 1627, for refusing to pay his proportion of the general loan which the King attempted to raise on his own authority, Hampden was imprisoned in Hampshire for nearly a year. His uncle, Sir Edmund Hampden, with whom he is sometimes confused, was one of the five knights who sued for liberty on a writ of habeas corpus in the famous Five Knights case. The prisoners were all set free when Charles found it necessary to summon his third Parliament. Hampden's industry in Parliament now rendered him one of its leading and most useful members; he was on most of its committees; but after the dissolution of the Parliament of 1628–29 he retired to his estate and devoted himself to study, and country sports and occupations. In 1634 Charles had recourse to the impost of ship money, claiming that it was not a tax, but a commutation for the military service, which every one owed. At first limited to London and the maritime towns, and levied only in time of war, it was in 1635 extended to inland counties in time of peace, when Hampden resolutely refused to pay it, and his example was followed by nearly the whole county of Buckingham. In 1637 he was prosecuted before the Court of Exchequer for nonpayment, when a bare majority of the judges gave a verdict against him while the moral victory was clearly with Hampden. In the Short Parliament of 1640 Hampden took a prominent part in the great contest between the crown and the House of Commons. To the Long Parliament he was returned for both Wendover and the County of Buckingham, and made his election for the latter. For his resistance to the King's proceedings, he was one of the five members whom Charles, on Jan. 4, 1642, rashly attempted in person to seize in the House of Commons. On the breaking out of the Civil War he raised and became colonel of a regiment in the Parliamentary army under the Earl of Essex. He was also a member of the Committee of Public Safety. He was an excellent soldier, and constantly urged Essex to a more energetic conduct of the campaign. Some of his reputed victories over the Royalists, however, as at Aylesbury and Reading, are unhistorical. Prince Rupert having attacked a Parliamentary force at Chinnor, near Thame, Hampden joined a small body of cavalry that was rallied in haste to oppose him, and in the fight that ensued at Chalgrove Field received in the first charge a wound of which he died six days later, on June 24, 1643.

Consult: Anthony à Wood, *Athenæ Oxonienses*, vol. iii (Oxford, 1813–20); Clarendon's *History of the Rebellion* (6 vols., Oxford, 1888); Lord Nugent, *Memorials of John Hampden* (2 vols., London, 1832), with letters; Macaulay's essay on *Lord Nugent's Memorials of Hampden* (New York, 1861); John Forster, *Life*, in "Eminent English Statesmen," vol. iii (London, 1837); id., *Arrest of the Five Members* (London, 1860); id., *Debates on the Grand Remonstrance* (London, 1860); id., *Sir John Eliot* (2 vols., London, 1864); S. R. Gardiner, *History of England, 1603–42* (10 vols., London and New York, 1883–84); and his *Great Civil War* (4 vols., London and New York, 1893).

HAMPDEN, John (c.1656–96). An English politician, grandson and namesake of the famous statesman. By 1679 he represented his native county, Buckingham, in Parliament, but made no great sensation there, and became known more as a partisan than as a debater, while his long sojourns in France developed free-thinking tendencies. On suspicion of being implicated in the Rye House Plot, he was imprisoned in the Tower (1683), tried and condemned to death, but saved himself by appealing to the King's mercy. He lost caste with his own party, and when it gained the ascendancy at the accession of William III Hampden did not receive the honors nor the position he expected. He was defeated when he ran for Parliament and, turning despondent, committed suicide.

HAMPDEN, Renn Dickson (1793–1868). Bishop of Hereford. He was born in Barbados, March 29, 1793, and educated at Oxford, with a brilliant record in scholarship. He published *An Essay on the Philosophical Evidence of Christianity* (1827), and *Parochial Sermons Illustrative of the Importance of the Revelation of God in Jesus Christ* (1828). In 1829 he returned to Oxford and was tutor at Oriel (1832), after having twice acted as public examiner in classics. He was selected to preach the Bampton Lectures in 1832, when he chose for his subject *The Scholastic Philosophy Considered in its Relation to Christian Theology* (London, 1833). He became the principal of St. Mary's Hall (1833), and professor of moral philosophy (1834), and in 1836 regius professor of divinity. The last appointment caused strong opposition because certain of his views placed the authority of the Scriptures higher than that of the Church. Later he published a *Lecture on Tradition* (1839; 5th ed., 1842) and a lecture on *The Thirty-nine Articles of the Church of England* (1842). In 1847 he was nominated to the see of Hereford, and only consecrated after bitter opposition on the part of the Tractarians, who were joined by Dr. Merewether, the dean of Hereford. He was not embittered by this opposition, but quietly pursued his life as bishop and scholar. He published *The Fathers of Greek Philosophy* (Edinburgh, 1862), the nucleus of which was articles he wrote for the eighth edition of the *Encyclopædia Britannica*. He died in London, April 23, 1868. Consult his life by his daughter (London, 1871).

HAMPDEN, Richard (1631–95). An English statesman. He was the second son of the famous John Hampden (q.v.), and at the age of 25 entered political life as member for Buckinghamshire. As an ardent supporter of Cromwell Hampden had a seat in Parliament until the end of the Protectorate, and afterward during a considerable part of the reigns of Charles II and James II. Inheriting the political principles and sterling character of his father, he resisted the Stuart encroachments upon popular rights, and his fear of the religious consequences led him to advocate earnestly the measure for excluding the Duke of York, afterward James II, from the throne. In the parliamentary deliberations in 1689, which ended in the call of William, Prince of Orange, to the British throne, Hampden bore an important part, and upon the establishment of the new dynasty was rewarded with responsible appointments. He was made Privy Councilor, Commissioner of the Treasury, and finally Chancellor of the Exchequer in 1690.

HAMPDEN SIDNEY. A community in Prince Edward Co., Va., 54 miles from Lynchburg, on the Buffalo River (Map: Virginia, F 4). It is the seat of the Hampden Sidney College, established in 1776, and is situated in an agricultural region, producing lettuce, tobacco, and grain. The water works and gas plant are owned by the college. Pop., 1914 (local est.), 400.

HAMPDEN SIDNEY COLLEGE. A college at Hampden Sidney, Va., founded in 1776 and chartered in 1783. It is under Presbyterian auspices, but is nonsectarian. It confers the following degrees: A.B., B.S., B.Litt., and A.M. The attendance averages 115. The college has buildings, grounds, and equipment valued at $281,000, productive funds amounting to $190,000, and an income of $25,000. The library contains about 18,000 volumes. Among its early trustees were Patrick Henry and James Madison; among its presidents Rev. Samuel S. Smith, president of Princeton, Rev. John Blair Smith, first president of Union College, New York, and Rev. Archibald Alexander, founder of Princeton Theological Seminary; and among its alumni President William Henry Harrison and General Sterling Price. Extensive improvements have been made recently in buildings and equipment. The requirements for entrance and for graduation are those of the standard American colleges.

The president in 1914 was Rev. H. T. Graham, D.D.

HAM'POLE, Richard Rolle of. See Rolle, Richard.

HAMP'SHIRE, Southampton, or familiarly Hants. A maritime county in the south of England, bounded on the west by Dorsetshire and Wiltshire, on the north by Berkshire, on the east by Surrey and Sussex, and on the south by the English Channel (Map: England, E 5). Area, including Isle of Wight, 1645 square miles. The surface is irregular, being traversed by the North and South Downs. The principal rivers are the Test, which is joined by the Anton, the Itchen, and the Avon. The climate of the country is in general mild and favorable to vegetation; the climate in the south of the Isle of Wight is milder than that of any other portion of Great Britain except southern Cornwall. Hops are cultivated, and the bacon cured here is famous. Vegetable gardening is an important pursuit. Southampton and Portsmouth, both termini of important railways, are the chief centres of trade, while Winchester is the capital. At Aldershot is the principal military training camp in Great Britain and headquarters of the First Army Corps. The New Forest is an extensive tract in the southwest of the county. Hampshire contains many interesting relics of the early ages of English history. Of these the chief is Portchester Castle on Portsmouth harbor. Pop. (including Isle of Wight), 1891, 692,055; 1901, 799,582; 1911, 950,579. Consult Shore, *History of Hampshire* (Southampton, 1892), and the *Victoria History of the Counties of England: Hampshire* (5 vols., London, 1912).

HAMP'STEAD, hăm'stĕd. A metropolitan borough in the County of London, England, 4 miles northwest of St. Paul's Cathedral (Map: London, D 6). The borough has an area of 3½ square miles, over 15 per cent of which is devoted to the finest open public grounds of the metropolis. Hampstead is the seat of several benevolent and other metropolitan institutions, has one of the finest of London town halls, municipal electric lighting, baths, and public library. It is situated on a range of hills that reach their greatest altitude of 443 feet in Hampstead Heath, which commands extensive views. It was formerly a village celebrated for its mineral springs (which have now disappeared) as far back as the Roman period, and many valuable archæological finds have been made here. From early times it has been a favorite residential section, with numerous elegant mansions and villas of Londoners. It has interesting artistic and literary associations with Pope, Addison, Gay, Steele, Johnson, Byron, Keats, Leigh Hunt, Joanna Baillie, Constable, Du Maurier, and others. Hampstead Heath, with an area of 240 acres, and Primrose Hill, on the southeast with 265 acres, acquired by the London County Council since 1870 as public grounds, are popular and greatly frequented resorts on Sundays and holidays, while on the August bank holiday more than 100,000 visitors are found each year on Hampstead Heath. Pop., 1901, 81,942; 1911, 85,510. Consult: Baines, *Records of Hampstead* (London, 1890); White, *Sweet Hampstead* (ib., 1901); A. Maxwell, *Hampstead: Its Historic Houses, its Literary and Artistic Associations* (ib., 1912); T. J. Barrett, *Annals of Hampstead* (3 vols., ib., 1912); *Hampstead Heath: Its Geology and Natural History*, prepared by the Hampstead Scientific Society (ib., 1913).

HAMP'TON. A city and the county seat of Franklin Co., Iowa, 92 miles north of Des Moines, on the Chicago, Rock Island, and Pacific, the Minneapolis and St. Louis, and the Chicago Great Western railroads (Map: Iowa, D 2). It has a fine courthouse, a Carnegie library, and fine public parks. The city is the centre of an agricultural and stock-raising district and is an important market for horses. It contains a canning plant, foundry and machine shops, and nurseries. The water works are owned by the city. Pop., 1900, 2727; 1910, 2617.

HAMPTON. A city and the county seat of Elizabeth City Co., Va., on the north side of Hampton Roads, 2½ miles northwest of Fortress Monroe and 16 miles north by west of Norfolk, with which it is connected by steam ferry on the Chesapeake and Ohio Railroad, and on several steamship lines (Map: Virginia, H 4). It is a popular resort, with good bathing facilities, and has considerable trade in agricultural produce, fish, oysters, clams, and crabs. The city is the seat of the Hampton Normal and Agricultural Institute, and has the church of St. John (Protestant Episcopal), built in 1660, Old Point Comfort College, an artillery school, a school for deaf and blind children (colored), the Huntington Library, a National Soldiers' Home, with 3500 inmates, and a National Cemetery where 3323 bodies are interred, 600 of unknown dead. The government is administered under a charter of 1910 by a mayor, elected every four years, and a council. Pop., 1900, 2764; 1910, 5505. Hampton was settled (before 1610) on the site of an old Indian village, Kecoughtan, and for many years was known by that name. It was one of the original boroughs represented in 1619 in the first Virginia Legislature. During the Revolution and the War of 1812 it suffered by fire at the hands of the English, and again in August, 1861, it was burned by a Confederate force under General Magruder.

HAMPTON, John Somerset Pakington, first Baron (1799–1880). An English statesman, born in Worcestershire. His father was William Russell, but he adopted his mother's name, Pakington, upon inheriting estates from her family. He received his education at Eton and at Oriel College, Oxford, but took no degrees. He entered Parliament in 1837 for Droitwich and continued to sit for the same constituency until 1874. In 1852 he was Colonial and War Secretary under Lord Derby, First Lord of the Admiralty in 1859, and was again appointed to the same position in 1866, when his party returned to power. He was War Secretary under Disraeli, and was made Baron in 1875. His parliamentary labors tended towards advancement in education and freedom in religion. From 1875 until his death he was Chief Civil Service Commissioner.

HAMPTON, Wade (1754–1835). An American soldier and planter, grandfather of Gen. Wade Hampton (1818–1902). He served with distinction under Marion and Sumter in the Revolutionary War, but, as McMaster says in his *History of the People of the United States* (vol. iv, p. 49), he "was another of that small class of officers who, after serving with credit in the War for Independence, fought with discredit in the War of 1812." Not only did he show no ability during the disastrous campaign in which he took part as major general in Wilkinson's army, but he helped to render abortive the projected invasion of Canada in 1813 by the enmity which he displayed towards his superior. The next year he resigned his commission and returned to South Carolina, where he became one of the wealthiest planters in the State. He was twice elected to Congress, once in 1794 and again in 1802.

HAMPTON, Wade (1818–1902). An American soldier and politician, the third of that name, born at Columbia, S. C., March 28, 1818, the son of one of the wealthiest planters in the South. He studied law at the University of South Carolina, but instead of practicing gave all his time to the management of his extensive estates. Although a Democrat, he belonged to the Union rather than the States' rights wing of the party—a fact which shut him out from political preferment in a State where radicalism was rife. When South Carolina seceded from the Union, he raised and equipped at his own expense the famous "Hampton Legion." At the head of these troops Hampton participated in the first battle of Bull Run and in the Peninsular campaign, was wounded at Fair Oaks, and soon afterward was commissioned brigadier general of cavalry. He took part in Lee's northward advance in 1863, was thrice wounded at Gettysburg, and was promoted major general on August 3 following. He was engaged in opposing the advance of Sheridan in the Shenandoah valley in 1864, and was in August of that year commissioned lieutenant general and placed in command of all Lee's cavalry. Later he commanded the cavalry in Johnston's army, which opposed Sherman's advance from Savannah in 1865. After the war he entered enthusiastically into the work of building up the South and reconciling its citizens to the outcome of the struggle. In 1876, having the confidence of the negroes, he succeeded in breaking the solid colored vote and was elected Governor, ending the "carpet-bag" rule. He was hailed as savior of his State. In 1878, by an accident with a shotgun, he lost a leg, and while he was lying at death's door was elected to the United States Senate. He was an advocate of moderate protection and sound money, and, with the rise of the Tillman faction and Populist principles, he retired from the Senate in 1891. From 1893 to 1897 he was United States Commissioner of Railroads, to which office he was appointed by President Cleveland. He was married twice—to Margaret, daughter of Francis Preston, and to a daughter of Governor McDuffie, of South Carolina. He died April 11, 1902. Consult E. L. Wells, *Hampton and Reconstruction* (Columbia, S. C., 1907).

HAMPTON COURT. An English royal palace, situated amid extensive pleasure grounds, on the north bank of the Thames, 1 mile from the village of Hampton and about 15 miles west-southwest of London (Map: London, G 4). It dates from 1515, when it was built for Cardinal Wolsey, who presented it to Henry VIII. The palace is built of red brick with stone facings and consists of three quadrangles, with some smaller courts. The great east and south fronts were built, from designs by Sir Christopher Wren, for William III. In the palace Edward VI was born, Queen Jane Seymour died, and Charles I was imprisoned. It was the occasional residence of Cromwell and was a favorite periodical residence of the sovereigns until the reign of George II. It contains 1000 rooms, 800 of which in suites are now occupied by needy persons of position in favor with the King. There is a famous picture gallery, with a valuable collection of old masters. The gardens cover 44 acres of land; one of the most notable features is the labyrinthine maze. The palace and grounds are opened daily to the public, free of charge, and constitute a popular holiday resort of the Londoners. Consult: E. Law, *Hampton Court in Tudor, Stuart, Orange, and Guelph Times* (3 vols., London, 1885–91); id., *A Short History of Hampton Court* (2d ed., ib., 1906); C. Jerrold, *Fair Ladies of Hampton Court* (Boston, 1911); W. C. Jerrold, *Hampton Court* (ib., 1913).

HAMPTON COURT CONFERENCE. A conference at Hampton Court, shortly after the accession of James I to the throne of England, for the discussion of religious differences. The King presided, and was supported by Archbishop Whitgift, with eight bishops, five deans, and two other clergymen. The Puritan party, whose demands were under consideration, were represented by John Reynolds, dean of Lincoln, and three other eminent clergymen of moderate views. These demands had been presented to the King in the previous year in what is known as the Millenary Petition, because it was intended to be signed by 1000 Puritan clergymen, though in fact it seems not to have been done, about 750 clergymen having probably signified their adherence by letter. It disclaimed schism and, unlike former demands of the Puritan party, carefully refrained from attacking episcopacy, restricting its prayers to a purification of the ritual and the encouragement of preaching as an essential part of the service, together with greater latitude of belief for those clergymen who objected to subscribing to the whole of the Prayer Book; and, lastly, to the reform of a few enumerated abuses, principally in matters of discipline.

There were three sessions of the conference—on January 14, 16, and 18, 1604. The petitioners were admitted to the second, in which James preserved for a time an appearance of impartiality, interrupting, however, to say, "It is my aphorism, no bishop, no king," and becoming more and more inflamed by the discussion, he put a stop to it with the declaration: "If you aim at a Scottish presbytery, it agreeth as well with monarchy as God and the devil. . . . If this be all that they have to say, I shall make them conform themselves, or I will harry them out of the land, or else do worse." On the third day the King's decision, save for a few points entirely adverse to the petitioners, was announced in indecorously harsh language. This marks the beginning of the close connection between the bishops and the house of Stuart and the alienation of the Puritan party.

The Millenary Petition is printed in Prothero, *Statutes and Constitutional Documents, 1559–1625*, p. 413 (Oxford, 1894), together with a few documents bearing upon the conference. The Petition and James's proclamation for the use of the Prayer Book are also to be found in Gee and Hardy, *Documents Illustrative of English Church History* (London, 1896). Consult also Gardiner, *History of England, 1603–42*, vol. i (New York, 1883–84).

HAMPTON NORMAL AND AGRICULTURAL INSTITUTE. An institution for the education of negroes and Indians, situated on a plantation of 170 acres on the Hampton River, Va., 2 miles from Old Point Comfort. The school was opened in 1868 under the auspices of the American Missionary Association, with Gen. S. C. Armstrong in charge. In 1870 it received a charter from the State. It is a private corporation, administered by a board of 17 trustees of different denominations. The school owns over 1000 acres of land, with 140 buildings, including, besides dormitories and recitation halls, a library with 37,000 volumes, a church, a hospital, gymnasium, a well-equipped trade school, and a large building for domestic science and agriculture. The instruction comprises academic, trade, agricultural, domestic science, and normal courses. The Armstrong and Slater Memorial Trade School, opened in 1896, gives training in the theory and practice of carpentry, painting, blacksmithing, tailoring, and other handicrafts. The girls are instructed in housework, laundry work, cooking, sewing, upholstery, and other home and farm occupations. A farm, with barn and stock, greenhouses, and experiment station, furnishes work and instruction for agricultural students. Five miles from the school is another farm of about 600 acres, largely for stock, also worked by students. The expenses of tuition are met by contributions; but in pursuance of the school's policy to foster independence in the students, those who are unable to pay their board are required to make a return in labor. The young men are under military discipline and are organized in a battalion of six companies. The school publishes a monthly paper, the *Southern Workman*, devoted to matters relating to the two races and printed, as is all other school literature, by the students' printing department. In 1914 the school had 135 instructors and an attendance of 1309, of whom about 38 were Indians. The day school is closed from June to October, but the industrial departments continue through the summer. A normal institute is carried on during four weeks in the summer for the colored teachers of the South. Between 400 and 500 attend. The institute has graduated over 1800 students, of whom by far the greater number of those living are engaged in teaching. At least 9000 undergraduates have gone out from the school. Many former students of both races are successful farmers or engaged at their trades or in various business enterprises, while a limited number have fitted themselves for professional careers. The most noted graduate is Booker T. Washington (q.v.), of the class of 1875. The endowment of Hampton is about $2,700,000, and the annual income of about $300,000 is received from endowments, from the State land scrip and agricultural funds, the Slater fund, the General Education Board, from churches, Sunday schools, and from private benefactions. The president in 1914 was Rev. H. B. Frissell, D.D. Consult H. B. Frissell, "Hampton Institute," in *From Servitude to Service* (Boston, 1905).

HAMPTON ROADS. The lower part of the estuary of the James River, Va., where it falls into Chesapeake Bay. It is an important military point and is defended by Fort Wool and Fortress Monroe. Its channel is broad and deep, and the harbors along its shores, especially that of Norfolk, are excellent. This fact, together with the number of railroad lines which terminate at Norfolk and other points on its shores, gives it a considerable commercial importance. During the Civil War there were two naval engagements in and near Hampton Roads. On March 8, 1862, the frigate *Congress*, the sloop of war *Cumberland*, the steam frigates *Minnesota* and *Roanoke*, and the ship *St. Lawrence* were in the roadstead, when the *Virginia*, an ironclad Confederate craft, formerly the United States steam frigate *Merrimac*, which had been seized the year before, attended by two small steamers, came from Norfolk, passed rapidly by the *Congress*, exchanging broadsides, and ran directly into the *Cumberland*, which sank in less than three-quarters of an hour. The *Congress* was disabled and set on fire, and eight hours later her magazine exploded. The other Union vessels escaped. The Union loss was 286; that of the Confederates only about a dozen. On the following day the famous contest occurred in the Roads between the Federal *Monitor* and the *Virginia*. See MONITOR.

HAMPTON ROADS CONFERENCE. In American history, an informal conference, with reference to the arrangement of a peace between the North and South, held on a vessel, the *River Queen*, near Fort Monroe, Feb. 3, 1865, towards the close of the Civil War, between President Lincoln and Secretary of State Seward, representing the United States government, and Vice President Alexander H. Stephens, Senator Robert M. T. Hunter, and Assistant Secretary of War John A. Campbell, representing the Confederate States. The conference was brought about primarily by Francis P. Blair (q.v.), who conceived that the war might be closed and the two sections of the country reunited by arranging for joint action on the part of the Federal and Confederate armies against Maximilian in Mexico, with a view to the enforcement of the Monroe Doctrine and the possible absorption of Mexico by the United States, the Southern States to agree, however, to the complete abolition of slavery within their boundaries. President Lincoln refused to consent to such a conference except on the basis of union, and the Southern commissioners somewhat equivocally acceded to his terms. During the conference, which lasted for four hours, President Lincoln expressed himself in favor of the admission of the Southern States, after their surrender, to immediate representation in Congress, and stated that in regard to the confiscation acts he should "exercise the power of the executive with the utmost liberality," but that he would never modify to the slightest extent the Emancipation Proclamation, though "if the war should then cease, with the voluntary abolition of slavery by the States," he should, personally, favor the payment by the Federal government of a fair indemnity to the former slave owners. He disapproved, however, of the project for a joint attack upon the French in Mexico, and refused to consent to any treaty with the Confederate government as such, or to consider any proposition for peace which did not provide for the complete restoration of the Union. The conference broke up without any agreement having been reached, and the Confederate commissioners immediately returned to Richmond. Consult: Nicolay and Hay, *Abraham Lincoln: A History*, vol. x (New York, 1890); A. H. Stephens, *The War between the States*, vol. ii (Philadelphia, c.1868–70); Davis, *Rise and Fall of the Confederate Government*, vol. ii (New York, 1881).

HAM'STER (Ger., from OHG. *hamstero*, weevil; possibly borrowed from Lith. *staras*, hamster). A burrowing gregarious rodent of the Old World, representing a subfamily (Cricetinæ) of the mice (Muridæ) and having the troublesome habits of the North American gophers. The group is characterized by the tuberculous crowns of the molar teeth, by the extensive cheek pouches, and by the short, hairy tail. The hamster (*Cricetus vulgaris*, or *cricetus*) is a native of the north of Europe and of Asia and is abundant in many parts of Germany and Poland, but rare west of the Rhine. It is of variable color, usually reddish gray above, the belly black, the feet white, and large white spots on the sides, throat, and breast. It is larger and of stouter form than the common rat, with the tail only about 3 inches long. It burrows in dry soils, each individual making a burrow for itself, to which there are more entrances than one, and which also contains several holes or compartments, one of them lined with straw or hay, in which the animal sleeps. Some of the chambers are capacious enough for the storing of large quantities of seeds or other provisions, even to the amount of 60 or 100 pounds of grain or beans, which the animal carries thither in its cheek pouches, and on which it feeds during the milder parts of winter, spending the most severe part of that season in a state of torpid hibernation. It is a great pest to the farmers and the object of their unceasing hostility; but it is very prolific and produces two or three broods in the year, 16 to 18 at a birth. This leads occasionally to their appearing in countless swarms, overrunning the fields in migrating hordes which form a devastating plague until gathering enemies and disease kill them off. The hamster feeds generally on vegetable food, as leaves, seeds, and the like, and is said also to devour small quadrupeds, birds, frogs, etc. It is a fierce and pugnacious animal and exhibits more than the pertinacity of the bulldog. The skins of hamsters are of some value. As at present understood, the genus *Cricetus* contains a single species divided into a number of subspecies. The two other genera in the subfamily are both African.

HAMSUN, hȧm′sụn, KNUT (1859–). A Norwegian author, born in Lom, Gudbrandsdal. He was the son of a tailor, was brought up by an uncle in one of the Lofoten Islands, became a cobbler's apprentice, and at 18 wrote and had printed a poem, *Et gjensyn*, and a novel, *Björger*. He ambitiously entered the University of Christiania, but was ill prepared and could not finish his course. Hoping to become a Unitarian minister, he went to America, and tried various employments, occasionally lecturing on French literature in Minneapolis. He went back to Christiania and attempted authorship without success. But after three years on a Newfoundland fishing boat, he wrote for a Danish periodical his novel fragment *Sult* (1888), which portrayed the cravings of a young man, and which at once secured him a place in the front rank of the young authors of the North. After a brilliant and none too kind criticism of America, *Fra det moderne Amerikas aandsliv* (1889), and after having enlarged and issued *Sult* in book form (1890), he returned to the theme of loneliness in *Mysterier* (1892). *Redaktor Lynge* and *Ny jord* (both 1893) were political and radical—Hamsun was a member of the extreme Norwegian Left. His radical lectures on prominent men followed (1891–92). His first love story was *Pan* (1894), one of his best books. A dramatic trilogy—*Ved rigets port* (1895), *Livets spil* (1896), *Aftenröde* (1898); a drama in rhymed verse, *Munken Vendt* (1902), the story of a false priest; and the play *Dronning Tamara* (1903), on the theme of criminal love, showed his ability as a dramatist, as did *Siesta* (1897) in the field of the humorous short story, *Viktoria* (1898), probably his greatest novel, in longer fiction, *I eventyrland* (1903) in writing imaginative travels, and *Det vilde kor* (1904) in lyric verse, which contains his splendid poem to Björnson at To. Among his later works are the novels *Sværmere* (1904), *Under höststjernen* (1906), *Benoni* (1908), *Rosa* (1908), a story of the far north, *Den sidste glæde* (1912), and *Børn av tiden* (1913). His poverty-stricken and joyless childhood and youth he has described in "Oplevelser" (*Norsk Familie journal*, 1898). He sharply attacks what he thinks are the failings of modern Norway and does it in a witty, wonderfully clear style. His works have been translated into 17 languages. There are German versions of most of his books, published at Munich by the Langen-Verlag; Russian versions of many; Finnish and Bohemian of some; and in English *Hunger* (1899; from *Sult*, 1890), and *Shallow Soil* (1914; from *Ny jord*, 1893), a satiric description of the superficiality of life in a cosmopolitan city. His *Samlede romaner og fortallinger* are published in 12 vols. (Christiania, 1907–10). Consult the preface by Hyllested to *Shallow Soil* (New York, 1914), and Hyllested, "Knut Hamsun: An Appreciation," in the *American-Scandinavian Review* (New York, March, 1914).

HAMTRAMCK, hăm-trăm′ĭk. A village in Wayne Co., Mich., 5 miles northeast of Detroit. It has manufactures of wheels, iron and aluminium castings, automobile accessories, radiators, white lead and colors, brass goods, etc. There are also some truck-growing and general farming interests. Pop., 1910, 3559.

HAMY, ȧ′mē′, THÉODORE JULES ERNEST (1842–1908). A French anthropologist, born at Boulogne-sur-Mer, France. He studied medicine at Paris, received his diploma in 1868, and served as assistant naturalist, and after 1892 as anthropologist, at the Museum of Natural History. From 1890 until his death he was director of the Museum of Ethnography in the Trocadéro. He became an officer in the Legion of Honor in 1889 and a member of the Academy of Inscriptions in 1890. His publications comprise: *Précis de paléontologie humaine* (1870); *Crania ethnica* (1875–82), with Professor De Quatrefages; *Anthropologie du Mexique* (1884); *Decades Americanæ* (1896–99); *Origines du Musée d'Ethnographie* (1890); *Galérie américaine du Musée d'Ethnographie du Trocadéro* (1897); *Etudes historiques et géographiques* (1896); *Aimie Bonpland, medicin et naturaliste* (1906).

HAN, hăn. A Chinese dynasty. It was founded by one Liu-pang, a soldier of fortune (born 247 B.C., died 195 B.C.), who rebelled, took to soldiering, became Duke of P'ei, later Prince of Han, and after much fighting and many adventures became the acknowledged Emperor of the country and mounted the throne about 206 B.C. The capital was at Changan (now Signanfu in Shensi); but later, in the reign of the fifteenth Emperor (25 A.D.), it was changed to Loyang in Honan. Hence the division of the dynasty into Western, or Former, and Eastern, or Later, Han. It came to an end in 220 A.D., when the Empire became divided into "Three Kingdoms," one of which is known as the Minor Han (221–264 A.D.). In all 14 emperors ruled during the Former Han, 12 during the Later, and 2 during the Minor Han.

One of the first acts of Kao-ti, its founder, was to abolish the tyrannical laws of his predecessors and to establish a new code characterized by moderation and justice, and in the reign of his successors literature began to revive. In 91 B.C. appeared the first general history of the country, from the pen of Ssï-ma Ts'ien, the Herodotus of China, whose works covered the period from 2697 to 104 B.C. In 100 A.D. appeared the great dictionary of Hü Shen, in which all the words in Chinese literature—about 10,000 in all—are defined and explained. Early in the dynasty the Jews entered China and established a colony in Honan (see KAIFENG), and about 120 B.C., through the expedition of the Chinese general Chang-kien to the far west, communication between China and the countries of western Asia began to create a new epoch in Chinese civilization. In 67 A.D. Buddhism entered China under Imperial auspices, and Taoism, under the influence of the new cult, began to take on its present forms. The practice of burying slaves with the dead was abolished and clay figures used instead. Though not without internal troubles at times, and a usurpation that threatened the continuity of succession, the Han period was one of increasing prosperity and advancing civilization and culture. Consult: Williams, *Middle Kingdom* (New York, 1883); Giles, *Historic China* (London, 1882); F. Hirth, *Ancient History of China* (New York, 1908). See CHINA, *History*.

HAN'AFORD, PHEBE ANN (COFFIN) (1829–). A Universalist minister and author, born on the island of Nantucket. She was brought up a Quaker. She was married in 1849; became a minister in 1868 (the first woman minister ordained in New England); preached with success; and on several occasions performed the duties of chaplain to the Legislature of Connecticut. She was conspicuous in temperance work. Her varied writings include lives of *Abraham Lincoln* (1865), of *George Peabody* (1870), and of *Charles Dickens* (1870); *Leonette, or Truth Sought and Found* (1857); *The Soldier's Daughter* (1866); *The Young Captain* (1868); *From Shore to Shore, and Other Poems* (1870); *Women of the Century* (1877); *The Ordination Book* (1887).

HANAU, hä'nou. The capital of a district in Hesse-Nassau, Prussia, situated at the junction of the Kinzig with the Main, 12 miles east of Frankfort (Map: Germany, C 3). The newer, or industrial, portion of Hanau was founded in 1597 by Walloons and Protestants from the Netherlands. The most notable buildings are the castle, formerly the residence of the counts of Hesse-Philippsthal, situated in a large park (it is now owned by the city); the old church of St. Mary, mentioned at the beginning of the fourteenth century; the seventeenth-century church of St. John; the two ancient town halls, dating from the fifteenth and sixteenth centuries respectively; the seventeenth-century town hall, the theatre, and the house formerly occupied by the brothers Grimm, natives of Hanau. Hanau is an important industrial centre and is noted for its gold and silver ware and jewelry, the cutting and setting of precious gems. There are also manufactures of tobacco, cigars, platinum, aluminium, leatherware, chocolate, lithographed work, spices, gloves, carpets, paper, knit ware, machinery, and chemicals. Hanau has, near by, one of the largest powder factories in the world. There is a considerable trade in local manufactures, agricultural products, wine, and spirits. The town possesses canal communication and is well equipped with a Gymnasium, a mathematical academy, a natural history and historical society. In the vicinity are situated the fine palace of Philippsruhe and the bathing resort of Wilhelmsbad, with its iron springs. Pop., 1900, 29,846; 1910, 37,472, mostly Protestants.

Hanau is believed to have had its origin in a Roman settlement. It became a city early in the fourteenth century and was fortified in 1528. During the Thirty Years' War it was occupied repeatedly by the Swedes and the Imperial troops, and it was the scene of the last battle fought by Napoleon on German soil, at Rückingen. This conflict, which took place on the 30th and 31st of October, 1813, resulted in the severe defeat of the allied armies under Wrede.

HAN'BURY, BENJAMIN (1778–1864). An English Nonconformist historian, born at Wolverhampton. He was employed in the Bank of England from 1803 to 1859. He devoted himself to collecting documents bearing on all Nonconformist matters and took the most lively interest in the promotion of the cause. His works include: *An Historical Research Concerning the Most Ancient Congregational Church in England . . .* (1820); *Historical Memorials Relating to the Independents . . .* (1839–44); *A Life of Calvin* (1831).

HAN'COCK. A village in Houghton Co., Mich., opposite Houghton, on Lake Portage and on the Copper Range and the Mineral Range railroads (Map: Michigan, A 1). A ship canal to Lake Superior affords transportation facilities also by water. Hancock is in the centre of the Lake Superior copper region, and besides several highly productive copper mines has smelting works, foundries and machine shops, and other industrial establishments. Montezuma Park, a Finnish college, and Kerredge Theatre are among the features of the village. Settled in 1859, it was incorporated as a fourth-class city in 1903. The government is vested in a mayor and board of aldermen and a village council, elected on a general ticket. The water works are owned and operated by the municipality. Pop., 1900, 4050; 1910, 8981; 1914 (U. S. est.), 11,081.

HANCOCK, JOHN (1737–93). An American patriot of the Revolutionary period, president of the Continental Congress, a signer of the Declaration of Independence, and the first Governor of the State of Massachusetts. He was born at Braintree, Mass., Jan. 23, 1737, graduated at Harvard in 1754, and was adopted by an uncle, Thomas Hancock, who in 1764 left him a fortune of about £80,000, and to whose large mercantile business he succeeded. After his graduation he spent some time in England. He was for several years one of the selectmen of Boston, and after 1766 was repeatedly elected to the Massachusetts General Court, where he steadily resisted the encroachments of the British ministry. After the "Boston Massacre" (q.v.), in 1770, Hancock was a member of the committee which was appointed by the people of Boston to demand of Governor Hutchinson the removal of the British troops from Boston, and on the fourth anniversary of the "massacre" he delivered the customary commemorative oration, and by his boldness and eloquence attracted attention to himself anew as one of the leaders of the Patriot, or Whig, party. In June, 1774, he was appointed by the General Court, of which he was a member, one of the representatives of Massachusetts in the first Continental Congress, and in October he was appointed chairman (later President) of the first Provincial Congress of Massachusetts, which adjourned on December 10. He was likewise President of the second Provincial Congress, which assembled at Cambridge in February of the following year, and by his activity in this and other extra-legal proceedings incurred, with Samuel Adams, the bitter hostility of Governor Gage, whose expedition to Lexington and Concord on April 18–19 (see LEXINGTON) was sent out in part to secure the capture of these two leaders, and who, when issuing his proclamation of pardon on June 12, expressly excepted Hancock and Adams, "whose offenses," he said, "are of too flagitious a nature to admit of any other consideration than that of condign punishment." In defiance of the known hostility towards Hancock of the British ministry, and partly, no doubt, with a view to winning over members of the wealthier and more aristocratic families in New England, who as a class were inclined to conservatism and were disposed to remain loyal to the home government, Hancock was elected President of the Continental Congress in May, 1775. Though he resigned this position in October, 1777, he remained a member of the Congress until 1780, and served again in that body in 1785–86. In 1778, as major general of Massachusetts militia, he commanded the State troops in the Rhode Island expedition. In 1780 he was a member of the Constitutional Convention of Massachusetts, and upon the adoption of the constitution there framed was elected first Governor of the State, in which position he was retained by annual reëlections until 1785. After an intermission of two years he was again Governor from 1787 until his death. Though at first thought to be opposed to the Federal Constitution as drawn up by the convention at Philadelphia in 1787, he presided over the Massachusetts convention which ratified that document in 1788 and used his influence to win over those who favored rejection. Concerning Hancock's character and the extent of his influence there has been much difference of opinion among historical writers; but he is now generally considered to have been a man of undoubted patriotism and of considerable ability, whose usefulness at times was impaired by his vanity and his jealous disposition. There is no adequate biography of Hancock, but considerable material bearing upon his life may be found in Abraham E. Brown, *John Hancock, his Book* (Boston, 1898). Consult also L. Sears, *John Hancock, the Picturesque Patriot* (ib., 1912).

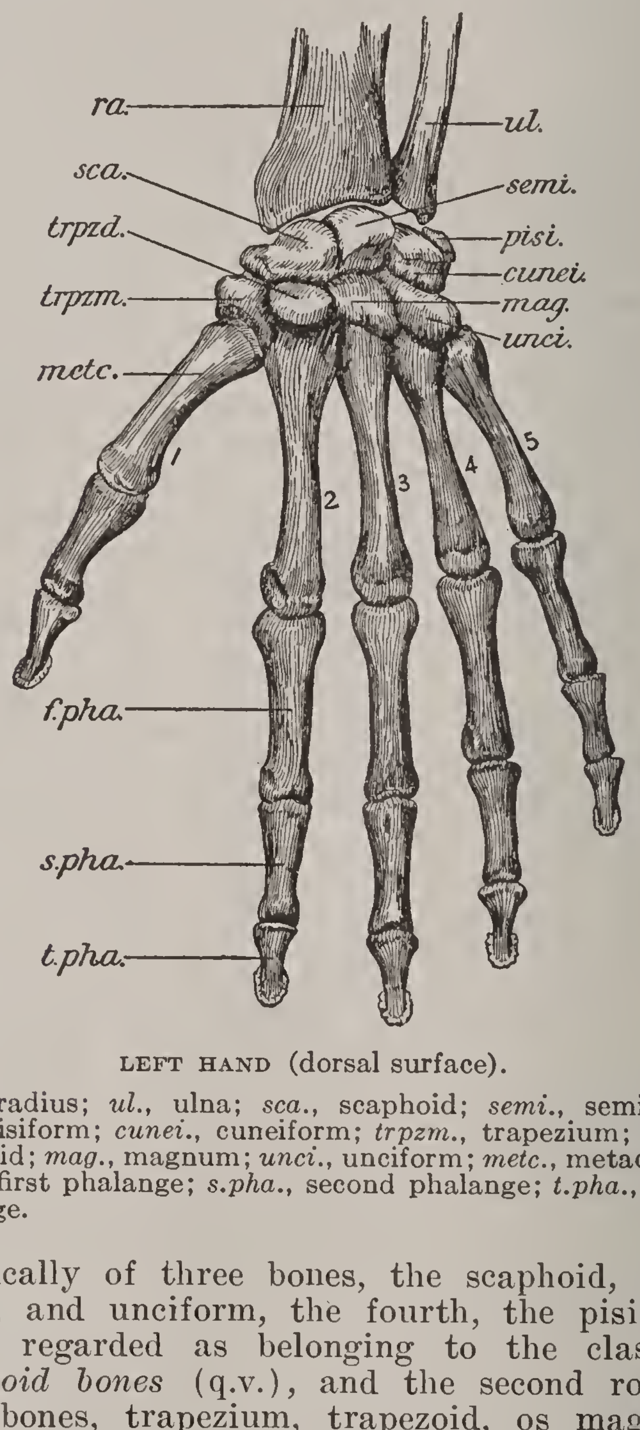
HANCOCK, WINFIELD SCOTT (1824–86). A distinguished American soldier, born Feb. 14, 1824, at Montgomery Square, Montgomery Co., Pa. He graduated at West Point, June 30, 1844, number 18 in a class of 25, and was assigned, July 1, 1844, as a brevet second lieutenant to the Sixth Infantry, with which he served for two years in the Indian country. He was appointed second lieutenant in the same regiment in June, 1846. In the Mexican War he commanded a company at the National Bridge (Aug. 12, 1847) and subsequently earned the brevet of first lieutenant for services at Contreras and Churubusco. From 1848 to 1855 he served successively as regimental adjutant and quartermaster and for a short time as assistant adjutant general, Department of the West. Having shown great aptitude in all staff details, he was appointed captain and assistant quartermaster in November, 1855, and was assigned to duty in Florida. He accompanied General Harney to Kansas, serving during the border troubles there, and in 1855 was ordered to proceed to Utah, arriving at Fort Bridger with his wagon train after a march of 700 miles in 26 days. At this point he found his old regiment under orders to march overland to California. He was directed to accompany it, in charge of the transportation. Organizing and equipping a train of 128 wagons from inferior materials, he conducted it safely over a rough trail of 1100 miles to its destination, at Benicia. From May, 1859, to August, 1861, he was chief quartermaster on the Pacific coast, with headquarters at Los Angeles.

At the outbreak of the Civil War Captain Hancock was among the first to be appointed to the grade of brigadier general of United States Volunteers, his commission being dated Sept. 23, 1861. Assigned to command a brigade in Smith's Division, Fourth Corps, Army of the Potomac, he first led it in action at Williamsburg, Va. (May 5, 1862), where he earned the mention, in General McClellan's dispatches, that "Hancock was superb." At Antietam, upon the death of General Richardson, he was placed in command of the First Division, Second Corps. In November, 1862, he was promoted to be major general of United States Volunteers. At Fredericksburg, Va., Dec. 13, 1862, his new command suffered a loss of 40 per cent, including 150 officers killed and wounded. The battle of Chancellorsville (May 2–4, 1863) was to a great extent prevented from becoming a total rout of the Federal forces by the steadiness of Hancock's Division. Soon afterward the command of the Second Corps was given to him. On the morning of July 1, 1863, the advance of Lee's army, having encountered the left wing of the Army of the Potomac in front of Gettysburg, was steadily pressing it back, with the loss of its commander, Reynolds. General Meade ordered Hancock to proceed to the battlefield, assume command there, and virtually to decide at his discretion whether the Army of the Potomac should meet the Army of Northern Virginia at that time and place. Hancock arrived on the field at 3.30 P.M., to find the Confederates massing their forces for a farther advance while confronted by the depleted lines of the Federal army. He quickly infused confidence among the troops, reformed the Federal lines, and in various ways so strengthened his position as to deter General Lee from making his contemplated attack. On the following day, during the nearly successful attempt of Lee to turn the flanks of the Federal army, Hancock was placed in command of the left wing, and, by judicious handling of his men and gallant personal effort, stemmed the tide of battle. On the third day a Confederate charge was directed against Hancock's command, the Federal centre, and succeeded in penetrating the first line, but was finally repulsed. Each side suffered terrible losses, and Hancock received a wound from which he never entirely recovered. In March, 1864, he resumed command of his corps, which, in the reorganization of the army under Grant, was reënforced by the transfer of two divisions from the Third Corps, making an aggregate strength of 43,055. Hancock was distinguished by the energy, good judgment, and tactical skill displayed in the Wilderness campaign. The unfortunate engagements in front of Petersburg and at Ream's Station were the first occasions in which his command met with reverses. On Aug. 12, 1864, he was promoted to be brigadier general in the regular army, and in November he was placed in command of the Middle Military Division. He received his commission as major general in the regular army on July 26, 1866. He was then sent to command the Department of Missouri, with headquarters at Fort Leavenworth, and during the year 1867 personally led an expedition against the Indians. In August of that year he was sent to New Orleans to supervise the rehabilitation of the States of Louisiana and Texas. In a general order he defined his duty, stating that "crimes and offenses committed in this district must be left to the consideration and judgment of the regular civil tribunals," but added that "armed insurrection or forcible resistance to the law will be instantly suppressed by arms." His conservative course not meeting with that support of the Washington authorities which he expected, he was at his own request relieved, and assigned to command the Military Division of the Atlantic, with headquarters at Governor's Island, where he remained until March, 1869, when he assumed charge of the Department of Dakota. In 1872 he was reassigned to the Division of the Atlantic. While acting in this capacity, General Hancock was in 1880 made the Democratic nominee for President of the United States, but was defeated by his Republican opponent, Garfield. General Hancock died at Governor's Island, after a brief illness, on Feb. 9, 1886. In 1850 he married Miss Almira Russell, of St. Louis, by whom he had two children. Consult: Walker, *General Hancock* (New York, 1894), in the "Great Commander Series," and id., *History of the Second Army Corps* (ib., 1886).

HANCOCK HOUSE. The former residence in Boston of Gov. John Hancock. It was erected in 1737 and taken down in 1863.

HAND (AS., Icel. *hond*, Goth. *handus*, OHG. *hant*, Ger. *Hand;* perhaps connected with Goth. *hinþan*, AS. *hentan*, to seize). The terminal portion of the superior limb of man. It is almost invariably distinguished by name from the same organ in other vertebrate animals; but actually there is little essential difference, and it is legitimate and proper, therefore, to speak of the terminal part of the fore limb of any quadruped as the hand, or *manus*, in distinction from the foot, or *pes*. We will first consider the human hand, and afterward its homologue in the lower animals.

"That," says Cuvier, "which constitutes the *hand*, properly so called, is the faculty of opposing the thumb to the other fingers, so as to seize upon the most minute objects—a faculty which is carried to its highest degree of perfection in man, in whom the whole anterior extremity is free, and can be employed in prehension." The peculiar prehensile power of the human hand is chiefly dependent upon the length, power, and mobility of the thumb, which can be brought into exact opposition to the extremities of all the fingers, whether separately or grouped together. The general arrangement of the bones of the arm is similar to that of the leg. The *humerus*, or arm bone, corresponds to the *femur*, or thigh bone; the lower end of the humerus is connected with the two bones of the forearm, the *radius* and the *ulna*, which correspond with the two bones of the leg. Then come the *carpal* bones, the *metacarpal* bones, and the *phalanges*, corresponding to the *tarsal* bones, *metatarsal* bones, and *phalanges* in the foot. The diagram shows the way in which the bones of the hand are arranged. The carpal bones are eight in number and are arranged in the wrist in two rows. The first, or upper, row consists practically of three bones, the scaphoid, semilunar, and unciform, the fourth, the pisiform, being regarded as belonging to the class of *sesamoid bones* (q.v.), and the second row of four bones, trapezium, trapezoid, os magnum, and unciform; so that, excluding the pisiform bone, the carpal and the tarsal bones correspond in number. As we commonly term the palm the *front* of the hand, the thumb becomes conventionally the *outer*, and the little finger the *inner* digit; but according to the rules of comparative anatomy, and in order to compare the hand and foot, we ought to reverse these terms. The outer of the carpal bones of the first row supports the bones of the thumb and forefinger and constitutes with them the *outer* division of the hand. The inner of the carpal bones bears the little and the next (the ring) finger and constitutes with them the *inner* division of the hand; while the middle one bears the middle finger and belongs to the *middle* division of the



LEFT HAND (dorsal surface).

ra., radius; *ul.*, ulna; *sca.*, scaphoid; *semi.*, semilunar; *pisi.*, pisiform; *cunei.*, cuneiform; *trpzm.*, trapezium; *trpzd.*, trapezoid; *mag.*, magnum; *unci.*, unciform; *metc.*, metacarpal; *f.pha.*, first phalange; *s.pha.*, second phalange; *t.pha.*, third phalange.

hand. The two outer bones are connected with the radius, while the inner bone is connected (indirectly by a thick ligament) with the ulna.

Collectively the carpal bones are so arranged that the carpus presents a dorsal convex surface, upon which the tendons of the extensor muscles of the fingers play, and a palmar concave surface, on which the tendons of the flexor muscles lie. The several bones are joined to one another—each bone being united to three or more others—by a large extent of surface and are girded together by strong ligamentous bands. The wrist is thus as strong as if it had been constructed of one solid piece of bone, while the slight gliding movements which occur between the several bones give it an elasticity which serves to break the shocks that result from falls upon the hand. The uppermost surface of the first row of carpal bones is convex, and this convex surface is received into a wide cup, or socket, formed by the lower articular surface of the radius, and by a ligament passing from that bone to the ulna. The metacarpal bones and the phalanges require no special description. Like the great toe, the thumb has only two phalanges, while each of the other digits has three.

The various movements of which the hand is capable may be divided into (1) the different directions in which the hand collectively can be moved, and (2) the movements of which the hand itself, without reference to the arm, is capable. The *scapula*, or shoulder blade, with which the principal arm bone articulates, is itself movable to a very considerable extent on the surface of the ribs on which it rests. Again, the socket in which the nearly spherical head of the *humerus*, or arm bone, lies is very shallow—not unlike the cup in the well-known toy *cup-and-ball*—and the arrangements of the shoulder joint generally are such as to permit so great a variety and so extensive a range of movements that we are able to apply the hand to every part of the body. This freedom of motion is due in a great degree to the clavicles, or collar bones, which, by steadying the shoulder blades and keeping the shoulders apart, afford a fixed point for the various muscles which we employ in raising the arms, in folding them over the chest, in the act of hugging, etc. The movement at the next junction of bones, the elbow joint, is very different from that at the shoulder. The latter is termed, from its construction, a ball-and-socket joint and admits of motion in all directions within definite limits; while the elbow is a hinge joint and merely admits of bending and straightening, or, in other words, of motion in one plane. We have next to consider a class of movements of the forearm and hand, to which there is nothing precisely analogous in the leg. The movements in question are called pronation and supination. In *pronation* (from Latin *pronus*, with the face downward), we turn the palm of the hand downward, as in picking up any substance from the table; in *supination* (from Latin *supinus*, with the face upward), we turn the palm upward, as for the purpose of receiving anything that may be placed in it.

These movements of pronation and supination are exceedingly important to the usefulness of the hand and are chiefly effected by three muscles. One of these muscles passes from a projecting process on the inner side of the humerus, at its lower end, to the outer edge of the middle of the radius. Its contraction causes the radius to roll over, or in front of, the ulna. It thus pronates the hand and is called a *pronator* muscle. Another muscle passes from a projecting process on the other side of the arm bone to the inner edge of the radius near its upper part. It runs therefore in an opposite direction to the former muscle and produces an opposite effect, rolling the radius and the hand back into the position of supination. Hence it is called a *supinator* muscle. The third is a very powerful muscle, termed the *biceps* (q.v.), which not only bends the elbow, but, from the mode in which its tendon is inserted into the inner side of the radius, "also rotates the radius so as to supinate the hand; and it gives great power to that movement. When we turn a screw, or drive a gimlet, or draw a cork, we always employ the *supinating* movement of the hand for the purpose; and all screws, gimlets, and implements of the like kind are made to turn in a manner suited to that movement of the right hand, because mechanicians have observed that we have more power to supinate the hand than to pronate it." Supination can only be performed to its full extent by man, and even in man it is not the natural or habitual position; monkeys can partially effect the movement, and in most of the lower animals the part corresponding anatomically to the hand is constantly in a state of pronation.

The movements of which the hand itself, without reference to the arm, is capable, are very numerous, and in this respect differ considerably from the corresponding movements of the foot. Thus, we can bend the fingers down upon the palm, or we can extend them beyond the straight line; we can separate them from one another to a considerable extent, and we can close them with considerable force. The wrist and hand are bent forward or flexed upon the forearm by three muscles, which pass downward from the inner condyle, or expanded end of the humerus, and are termed the *radial flexor*, the *ulnar flexor*, and the *long palmar* muscles. The first two of these muscles are inserted into wrist bones on the radial and ulnar sides respectively, while the third expands into a fanlike *fascia*, or membrane, in the palm of the hand, and thus serves both to support the skin of the palm and to protect the nerves and vessels which lie below it. Beneath the palmar fascia lie two sets of *flexor* muscles of the fingers, and they present so beautiful a mechanical arrangement as to merit special notice.

The *superficial flexor* muscle passes down the front of the forearm and divides into four tendons, which become apparent after the removal of the palmar fascia, and are inserted into the second phalanges of the fingers, each tendon splitting at its termination, to give passage to the similar tendons of the *deep flexor* muscle, which passes from the upper part of the ulna to be inserted into the last phalanx of each finger. These *flexor* muscles are antagonized by the *common extensor* muscle of the fingers, which, like the flexors, divides into four tendons, one for each finger. Besides these, there are a special *extensor* of the index finger, a series of muscles forming the ball of the thumb, which move that organ in almost every direction, and various small slips giving lateral and other movements to the fingers.

The hand possesses marvelous adaptability to a great variety of uses. The fingers are fitted for grasping small objects or for suspending the body from a horizontal bar. The hand may be made into a cup for conveying fluid to the mouth, or extended rigidly, as when swimming. A small needle may be used with great precision and delicacy in the same hand that wields a heavy sledge hammer or holds a taut rein over the back of a turbulent horse. The great flexibility of the fingers and their capacity for training in accurate work is seen in their use in playing upon the violin or the piano. Some of the commonest daily uses of the hand consist of very intricate and complex working of groups of muscles in which coördination is exact. Controlling the pencil in drawing or writing and rolling a cigarette may be cited as examples. It is not strange, in view of its adaptability and capacity for such accurate adjustment, that the hand was thought in old times to be a reservoir of special force which passed out of it upon occasion. The "laying on of hands" for the cure of the sick, or for the transmission of a beneficent influence, is as old as the Scriptures; and the touch of royalty was supposed to possess special virtue in healing scrofula, or "king's evil." See HANDS, IMPOSITION OF.

The markings in the palm of the hand are supposed to be indications of the character and temperament, and disciples of palmistry (q.v.) believe they can read the secrets of the future in the records of palmar lines and folds. The papillæ on the skin of the finger tips are arranged in concentric or ovoid lines. Probably these lines are never identical in different individuals. It is said that the Chinese use an impression of the papillary lines on the pulp of the thumb tips as a means of identification; and to the measurements of criminals by the Bertillon method, impressions of their thumbs as a further standard of comparison and identification have been added by the police of the larger cities (see FINGER PRINTS). The investigations of Francis Galton (q.v.) in this respect were noteworthy. Fingers differ much in their size and model and give hands different expressions. Righthandedness is a natural condition, for which several causes have been assigned, no one of them being convincing. It has been considered due to a larger arterial supply to the right side; to "an innate tendency to a predominance of nutrition on the right side in fœtal life" (Breschet); to the position of the fœtus *in utero;* and to the assumed fact that the centre of gravity of the body lies on the right side. Lefthandedness occurs in about 9 per cent of human beings.

There are many congenital and developmental anomalies encountered in a study of hands. In some rare cases the hand is wanting altogether. This condition is termed acheiria. If one or more fingers be missing, the condition is termed ectrodactylism. Hypophalangism is the name given to the condition in which the number of phalanges in a finger is less than normal. Polycheiria denotes a supernumerary hand; polydactylism, a supernumerary finger; polyphalangism, the condition in which the number of phalanges in a finger is greater than normal. The union of fingers together, web fingers, or syndactylism, also occurs; as well as cleft hand, club hand, and other deformities. In the disease acromegaly (q.v.) an enlargement of the hands takes place. Changes in the fingers and hands occur in many other diseases, as in myxœdema and syringomyelia (qq.v.). In pulmonary tuberculosis the extremities of the fingers may be bulbous, or clubbed, from change in the condition of the peripheral circulation. Consult Gray, *Anatomy* (Philadelphia, 1913).

HAND, COMPARATIVE ANATOMY OF THE. In birds the hand has been so profoundly modified for flight that it is considered as a distinct sort of organ—the wing. Among Amphibia the tailed forms have the hand constructed on the same general plan as the foot; it thus consists of digits, palm, and wrist; or, in terms of the skeleton, phalanges, metacarpals, and carpals, the latter the equivalent of the tarsals of the foot; in all amphibians there are four digits on the hand, except in three genera which have only two or three, but the number of phalanges differs considerably. The Urodela have a carpus of nine bones—a centrale, radiale, ulnare, intermedium, and five carapales; but in the Anura the intermedium is wanting. Among reptiles we find a general resemblance in the hand to that of the Urodela, though the digits bear claws or nails, which are always wanting in the Amphibia; crocodiles have no intermedium, and the carpales are only partially developed.

Among mammals we find a very great variety in the form and uses of the hand, the number of functional digits varying from one to five, though the number of phalanges is remarkably constant, for except in Cetacea there are two in the first and three in each of the others. In monotremes and marsupials the hand possesses no peculiar features worthy of special note, though in Echidna it is very stout and powerful, while among kangaroos it is rather small and comparatively feeble. The hands of the Edentata are remarkable for the reduction in the number of digits to four, three, or even two, and the long and very strong claws which they bear. In the Ungulata we find an even stronger tendency towards suppression of digits, for there are never more than four, and usually there are only two, sometimes only one, functional. In this order the hand resembles the foot (q.v.) so closely that it is not necessary to repeat here the various modifications; suffice it to say that the tapirs have four digits on the hand and only three on the foot, and that the metacarpals of the camel are separated by a deep cleft. In the Sirenia there are only four digits, and these are united by the integument to form paddles and bear only rudimentary nails. The Cetacea also have the hands transformed into paddles; but the carpus is made up of polygonal bones, the phalanges are numerous, and there are no nails. The hand of the Carnivora has never less than four digits, and they always bear claws, usually sharp and curved, and in cats retractile. The hand of the elephant is remarkable for being larger than the foot and for its very short and thick carpal, metacarpal, and phalangeal bones. Hyrax has four toes on the hand, but only three on the foot, and the nails are nearly flat. The Rodentia have rather small, often weak hands, with five clawed digits, while the Insectivora have rather stout hands, especially the moles. Of all mammals, bats have the most profoundly modified hands, since with them, as with birds, flight is the object in view. There is only one bone in the proximal series of the carpus, and the metacarpal bones and phalanges are greatly elongated to form the framework for the wing, which consists of a delicate membrane stretched between the digits and the foot. There are five digits, but only the first two (sometimes only the first) are provided with claws. Among the

Primates we find a hand more nearly like that of man, the digits being provided with flat nails, and the first digit being opposable to the others and thus forming a true thumb. The marmosets, however, have sharp curved claws, and the thumb is not opposable. Of all mammals, the gorilla has a hand most like that of man.

HAND, EDWARD (1744–1802). An American soldier of the Revolution, born at Clyduff, Kings County, Ireland. He came to America in 1774 and practiced medicine in Pennsylvania until the outbreak of the Revolution, when he served at the siege of Boston as lieutenant colonel in William Thompson's brigade. In 1776 he was appointed colonel. He served in the battles of Long Island and Trenton in 1777, was promoted to brigadier general, succeeded John Stark at Albany (1778), and took part in Sullivan's campaign against the Six Nations. He was in command of a brigade of light infantry (1780) and soon after succeeded Scammell as adjutant general; in 1798 Washington recommended him to a like post for the war with France. He was a member of the Continental Congress in 1784–85 and was a signer of the Pennsylvania constitution (1790).

HAND′BALL′. A game of ball similar to the English Fives, played in the United States chiefly on account of its physical benefits in training for contests of endurance, though it is also one of the sports under the regulations of the Amateur Athletic Union. It seems clear that the game is of Celtic origin and very ancient. There is an apparently authentic mention of its being one of the Tailten games, in the time of Erc, the last King of the Firbolgs, a race which inhabited Ireland in the early centuries of the Christian era, and it is of interest that the Venerable Bede records that St. Cuthbert excelled in the game.

Though the game may be played on a court of any reasonable size, a regulation court should be from 60 to 65 feet long, 22 to 25 feet wide, and 30 to 35 feet high in the front, tapering down to 12 feet at the back wall. A brick wall faced with marble makes an ideal front wall; the side walls should be faced with cement. The floor should be of white pine and very rigid. About 30 feet from the front wall a line is drawn parallel to it across the court, called the "ace line." Near the front wall is drawn the "over line." Every service coming off the wall must fall between these two lines to be in play. The ball should be a hollow sphere of rubber, 1⅞ inches in diameter and 1⅝ ounces in weight. The game is started by one player "tossing" out the ball on to the ground and hitting it on the rebound, with his hand, against the end wall. If it falls inside the short line, and the other player fails to return it, it counts an "ace" to the server. Should it be returned and the original server fail to return it, it is a "hand out." Then the service changes, and the game goes on alternately. The game is won by the player who first gets the number of aces agreed upon. In professional games the number is usually set at 21. Consult Egan, *Handball*, in "Spalding's Athletic Library" (New York, 1913).

HANDCUFFS, or HANDIRONS. See IRONS.

HAN′DEL, GEORGE FREDERICK, Ger. GEORG FRIEDRICH HÄNDEL, hĕn′del (1685–1759). A famous German musical composer, the greatest master of the oratorio. He was born at Halle an der Saale, Feb. 23, 1685. His father, a barber, and afterward a surgeon, at Halle, so opposed the development of his son's musical proclivities that the lad was obliged to practice at night upon a small clavichord secretly placed in the attic, when the rest of the family were asleep. A visit paid with his father in 1692 to a stepbrother in the service of the Duke of Saxe-Weissenfels had important results. Whenever during this visit young Handel found opportunity, he stole into the ducal chapel and played upon the organ. The Duke, chancing to hear him, questioned him, and, learning of his father's opposition, persuaded the latter to abandon his intention of making a lawyer of the boy. As a result, on returning to Halle, Handel began a thorough study of music under Zachau. Going to Berlin in 1696 to pursue his studies further, he became acquainted with Ariosti and Buononcini.

In 1703 he took a modest position in the orchestra of the Hamburg Opera House, but soon astonished the public by the skill with which he presided at the harpsichord during the temporary absence of the renowned Keiser. At this time he also applied for the post of organist at Lübeck; but learning that one of the stipulations in the competition was that the successful candidate should marry the daughter of the retiring organist, he withdrew. At Hamburg he formed a friendship with Mattheson, and when, in 1705, Handel produced his first opera, *Almira*, Mattheson took the chief rôle.

Visiting Italy, Handel produced in Florence the opera *Roderigo*, and in Venice *Agrippina*, which he composed in three weeks, and which was received with enthusiasm. Here he met Scarlatti, who greatly influenced Handel's subsequent works, Gasparini, and Lotti, and in Rome became the intimate of Cardinal Ottoboni. In 1709 he took service with the Elector George of Hanover (afterward George I of England).

In 1710 Handel went to England, where he spent practically the rest of his life. There the taste for Italian music was on the increase, and his *Rinaldo* achieved great success. The opera was patched together from his earlier works in 14 days and would have been finished sooner had the translator of the libretto been able to keep pace with him. The year 1713 saw the production of his *Te Deum* and *Jubilate*, in celebration of the Peace of Utrecht. They brought him a life pension of £200. When George I ascended the English throne, Handel, though previously in his service, avoided him. He feared his Utrecht music might have offended the former Elector, as the German Protestant princes had not regarded the treaty with favor. But his *Water Music*, performed during the Thames fête, led to a second annuity of £200. For three years, beginning 1718, Handel was musical director to the Duke of Chandos and during that time composed, among other pieces, the two Chandos Te Deums and the 12 Chandos anthems. During the period from 1720 to 1740 Handel, spurred on by the rivalry of Ariosti and Buononcini, produced more than a score of operas. The fact that their instrumentation was not fully written out, and the change in the style of opera demanded in England, prevented these works from receiving their just appreciation; but it is beyond cavil that they were superior to the compositions of his contemporaries.

Handel's career in England should have been uninterruptedly prosperous, but he ruined himself financially by undertaking, in rivalry with Buononcini, whom he finally vanquished, the responsibilities of operatic management as well as of composition. He, however, retrieved his fortunes by his oratorios. In January, 1739, he produced *Saul*, followed in April by *Israel in Egypt*, but although both oratorios were highly praised, they met with no popular favor at the time. The latter is considered by many even superior to his famous *Messiah*. *The Messiah* was produced for the first time April 13, 1742, in Dublin. At the first London performance, March 23, 1743, in Covent Garden, when the "Hallelujah Chorus" was reached, the King and the whole audience rose, and thus established a custom which continues to this day. George II's victory at Dettingen was celebrated by Handel with the Dettingen Te Deum and Anthem. In 1752 his eyesight began to fail, and he became totally blind. He, however, continued to accompany his oratorios on the organ, and did so at a *Messiah* performance only eight days before his death, which occurred April 14, 1759. He is buried in Westminster Abbey.

Though of liberal disposition and much interested in charity, Handel was at times choleric. Quarrels with his singers had much to do with his failure as a manager.

Handel's service to music lies largely in the grace and freedom with which he handled the musical forms of his day, especially as compared with the severer and much greater Bach, of whom he was a contemporary. Handel founded no school; he lacked the genius for creating new forms or for revolutionizing existing musical conditions. His choral work, especially in *Israel in Egypt, The Messiah*, and *Judas Maccabæus*, is great because of the massive effects he obtains by simple means. Greater musicians have superseded him in the fields of operatic and instrumental composition, but in oratorio he is still supreme. His works include 27 oratorios, 40 operas, 30 concertos for various instruments, many anthems and several cantatas. See ACCOMPANIMENT; CHRYSANDER.

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HANDEL AND HAYDN (hā′d'n) **SOCIETY.** See CHORAL SOCIETIES.

HANDELMANN, hän′del-män, GOTTFRIED HEINRICH (1827–91). A German historian and antiquarian, born at Altona and educated at Kiel, Heidelberg, Berlin, and Göttingen. His first historical work was *Die letzten Zeiten hansischer Uebermacht im skandinavischen Norden* (1853). With his friend Theodor Lehmann he edited *Jahrbücher für die Landeskunde der Herzogtümer Schleswig-Holstein und Lauenburg* (1858–63). After several years devoted to American history he turned his attention again to German antiquities, especially in his own province. In 1866 he was made professor at Kiel and conservator of the antiquities of Schleswig-Holstein. Handelmann's other historical works include: *Geschichte der Vereinigten Staaten* (2d ed., 1860); *Geschichte der Insel Haïti* (2d ed., 1860); *Geschichte von Brasilien* (1860); *Die dänische Reunionspolitik um die Zeit des siebenjährigen Krieges* (1866, 1870); *Geschichte von Schleswig-Holstein* (1874).

HAN′DEL SOCIETY. 1. A society formed in England in 1843 for the purpose of publishing Handel's works. Its object was accomplished between 1843 and 1858. The society, however, was dissolved in 1848. 2. A German society formed at Leipzig in 1856, which under the editorship of Chrysander has issued Handel's works in 100 folio volumes (1856–94). See CHRYSANDER.

HAND′FAST′ING (AS. *handfæstnung*, a clasping of the hand, from *hand*, hand + *fæstnung*, fastening, from *fæstnian*, to fasten, from *fæst*, OHG. *fasti*, Ger. *fest*, fast, firm). An ancient ceremonial of betrothal, which prevailed extensively in western Europe during the early Middle Ages, and which consisted in the plighting of troth and the clasping of hands in the presence of witnesses. It belonged to the class of betrothals known as *sponsalia per verba de presenti*. In Scotland the practice of handfasting developed into an irregular form of marriage of a temporary character, good for a year and a day. At the end of that time the relation came to an end or was made permanent by a ceremonial marriage. See BETROTHAL; MARRIAGE.

HAND GRENADE. A shell designed for throwing with the hand, used for many hundred years; at first, as mere envelopes containing incendiary composition and afterward as explosive shells. The invention of the shell gun caused them to fall into disuse, and upon the advent of the modern high-powered fast-firing gun, which stopped hand-to-hand fighting, they disappeared entirely for a time, but were extensively used in the Russo-Japanese War (q.v.). Some grenades are now fitted to be fired from rifles, and a new type merely carries burning composition, which floats for a time in the air and illuminates the ground beneath it. It is designed to disclose attempts to effect surprise and make night attack more dangerous. See GRENADE.

HAND′ICAP′PING (from *handicap*, apparently *hand i' cap*, in allusion to drawing lots from a cap). In all contests dependent upon strength and skill there will be some so superior that if they start under equal conditions with the other contestants they must always win. The consequence of this, if unrestricted, would be to deter other contestants; whereby not only would the sport be limited to these few, but the second class of players would lose the benefit of playing with them and learning from them the highest class in form. To remedy both these evils recourse is had to handicapping, i.e., an extra burden is placed upon, or a special requirement made of, a superior competitor, in favor of an inferior, in order to make their chances of winning equal.

In all sports wherein the competitors are to meet as members of the same association, careful note is taken of the performances of every man as they occur, i.e., the number of times he competes against other members of it, against whom it is, and by what margin he wins.

In speed foot races, in swimming, and in similar point-to-point contests, the slower performer in a handicap race has so much start ahead of the man whose past performances have put him in the first class, and therefore has a shorter distance to travel than his expert rival. In lawn tennis the players are handicapped by giving or owing strokes or by giving *bisques*. In cricket handicapping is usually accomplished by allowing a large number of players to the inferior team, 11 men playing against 18 or 22. In horse racing on the flat the horse which has proved itself in the past by its performances, or which by age or size or sex is naturally superior, is, where handicapping is resorted to, required to carry a heavier jockey, or to have weights placed on the saddle which, with the jockey's weight, will effect the same object. In polo, as practiced in America, the different players are handicapped by an allowance or penalty of so many goals, i.e., in matches the teams whose aggregate handicaps are less than those of their opponents are allowed the number of goals which is the difference between them and their opponents. In yachting the boats and their sails are measured, and the boats whose hull and sails are the largest have to make an allowance which is deducted at the end of the race from the actual time which it has taken to sail over a given course. In chess and draughts certain "men" are allowed to the inferior player, and in billiards the better of two players allows a certain number of "points" so as to equalize the game. These are the principles of handicapping; their application is an inexhaustible subject.

HAND LEAD. A small lead, weighing from 5 to 15 pounds, used for sounding in shallow water. Since the general adoption of the Thomson sounding machine leads weighing more than 15 pounds are seldom used. See LEAD, SOUNDING.

HAND ORGAN. See BARREL ORGAN.

HANDS, IMPOSITION OF. The ceremony employed in religious use, both ancient and modern, to symbolize the conferring of certain inward spiritual gifts. It is the survival of the belief that power possessed by a person could be transferred by the touch of the hand. Moses set Joshua apart as the leader of the people by laying his hands upon him (Num. xxvii. 23). Christ was entreated to heal the ruler's daughter (Matt. ix. 18) by the same action, and He Himself adopted it in blessing children (Matt. xix. 15). It is apparent from the New Testament that it was considered from the beginning of the Christian Church to convey spiritual grace, specifically the gift of the Holy Ghost (Acts viii. 17; 1 Tim. iv. 14). It was accordingly employed in confirmation, ordination, and the healing of the sick. The name *chirothesia* was used for the actual laying on of hands, while that of *chirotonia* designated the mere symbolic extension of the hand where the recipients of the grace were more than one. The imposition of hands is retained in the Roman Catholic and Anglican communions in confirmation and ordination, for the latter purpose among various Protestant bodies also; while in the modern Roman Catholic church the mere authoritative lifting of the priest's hand has taken the place of the former actual contact in absolution. The original magical significance has long since disappeared, and the ceremony is regarded as symbolic of the divine bestowal of grace.

HAND'SAW FISH. A name in California, translating the Spanish *serra*, for the local lancet fishes, in reference to their rows of sharp teeth. See LANCET FISH.

HAND'SEL (AS. *handselen*, Icel. *handsal*, delivery into the hand, from *hand*, hand + AS. *selen*, *sylen*, Icel. *sal*, Eng. *sale*, a giving, from *sellan*, *syllan*, to give, OHG. *sellan*, Eng. *sell*). A transaction of sale or barter of chattels or the striking of a bargain, evidenced by the shaking of hands—an ancient ceremonial which can be traced in many systems of primitive law. Its modern form is the giving of earnest (q.v.). The term is also sometimes used to denote earnest money, or part payment, by way of binding a bargain. In Scotland it popularly signifies a first transaction in trade, as, e.g., the first sale effected in the day or week, and is likewise employed to signify a present in the nature of a New Year's gift on the first Monday in the year —hence called Handsel Monday.

HANDS'WORTH. A suburban municipality of Sheffield, in Yorkshire, England, 3 miles east-southeast of that town. It is noted for its extensive manufacturing industries. Pop., 1901, 13,404; 1911, 14,198.

HANDSWORTH. A manufacturing town of Staffordshire, England, a suburb of Birmingham. It has undergone extensive improvements and has a number of public works. Pop., 1901, 53,000; 1911, 68,610.

HAND'WRIT'ING. Penmanship. The subject of handwriting in schools has received considerable attention recently from two points of view, the psychological and the pedagogical. Both include the questions of hygiene involved.

Psychologically writing involves a large number of movements, the coördination of arms, hands, and eyes, posture, and the control in general of the nervous system. Simple as writing apparently is, the training required demands control of the large muscles, the development of nerve centres, and the control of the small or accessory muscles in the wrist, fingers, and thumb, since the movements employed are not instinctive. The teaching of writing is based on the elimination of a large number of scattered nervous impulses, which are seen in the child in the first stages of the learning process, and the gradual development of an automatic habit. In the beginning visual control and attention to details play an important part and are gradually pushed more into the background. Legibility demands such visual control and attention to details until harmonious regularity is secured. Writing, reading, and speech are so closely allied in the brain centres that psychologically much may be gained by associating them closely in the teaching of writing. Generally, however, learning to write is similar to the development of any other type of motor habit in which certain definite movements are specialized until they become mechanical and subconscious. Attention to these movements, once they are well developed, only serves to impair accuracy, ease, and speed.

From the pedagogical point of view several points have been discussed. Many cases of spinal curvature and eyestrain among school children were traced by French doctors to the position assumed in writing as well as to the style of writing. Hence close attention was given to posture and to the question of slant in writing. Since a pronounced slant frequently involved the raising of the right shoulder, lateral curvature was attributed to this cause, as was also eyestrain, for in this position the right eye is farther from the paper than the left, thus leading to unequal accommodation. In 1879 the French Society of Public Medicine recommended that in writing the weight of the body should be equally distributed, the back be kept erect, and the shoulders parallel to the desk; that either vertical writing should be adopted or the paper be inclined to the left through an angle by which the writing inclines from the vertical. It was claimed that, while vertical writing is more legible, slant is more rapid, since the downward and upward strokes can be made more rapidly, and the hand moves more freely. A recent study; by Leonard P. Ayres, indicates that from the point of view of legibility the styles may be classed in the following order: vertical, i.e., from 90° to 80°; medium slant, 80° to 55°; and extreme slant, 55° to 30°. In another study it has been found that vertical writing is not natural with children, and that even when following a copy they always slant about 10° from that. The best results can probably be secured by tilting the paper at an angle of 30° from the edge of the desk.

In the matter of method it is now generally held that the aim to be secured is legibility rather than calligraphy, and that the synthetic method of writing whole words is better than the analytic, or building up of letters and words by practicing on strokes and hooks. The process of writing requires arm movements, especially of the forearm, and the delicate adjustments of the smaller muscles of the hand and fingers; the process is one whole, however, and the question whether arm and finger movements should be developed separately is no longer of importance. Since the early stages in the learning process require close attention to details, the writing lesson should be a separate unit; but there is some doubt whether in the later stages it should be retained as an independent lesson or be taught incidentally. Professor Thorndike in his study of handwriting found that three school systems which devoted 75 minutes a week to writing as an independent subject produced no better results than two systems with a zero time cost, and that handwriting, like spelling, but unlike arithmetic, is not much influenced by school management. Writing beyond a certain quality or standard of general merit is undesirable and requires more time than it deserves in days of the typewriter. Rapidity, he found, is a good sign, and the quality of rapid writing is better than that of slow, while practice to secure high quality of writing reduces speed. Professor Thorndike has developed a scale of handwriting based on the judgments of from 23 to 55 competent judges. It was found that 1000 samples could be ranked for general merit in 20 groups, and 20 was made the basis of the scale. Hence, to measure a specimen of handwriting, it can now be put alongside the scale and given the rating of the quality of writing to which it is nearest to the scale. Dr. Ayres has constructed another scale based solely on legibility as a test. He found also that good appearance of writing is not necessarily accompanied by high degree of legibility.

From the hygienic point of view, which is necessarily a consequence of those already discussed, it is recommended that in writing the pupil sit squarely at the desk, which should project about 2 inches over the seat, that he keep both feet on the ground, and that both elbows rest on the desk and the head remain erect, the eyes being 12 inches from the paper. The light should come from the left in order to avoid the shadow of the hand falling on the paper. The paper should have a smooth but not shiny surface, and the ink be black. A large penholder with a rough surface and a smooth pen are recommended. During the early stages a base line is advisable and assists visual control, but other lines, which were common in the copy-book days, restrict freedom and ease of movement.

Consult: L. P. Ayres, *A Scale for Measuring the Quality of Handwriting in Children* (Russell Sage Foundation Publication, New York, 1912); F. N. Freeman, "Experimental Study of Handwriting," in *Psychol. Rev. Mon. Suppl., Yale Studies*, N. S., vol. i, no. 3; E. Javal, *Physiology of Writing* (New York, n. d.); N. E. Thompson, *Psychology and Pedagogy of Writing*, bibliography (Baltimore, 1911); E. L. Thorndike, "Handwriting," in *Teachers College Record*, vol. xi, part ii (New York, 1910).

Identification. The genuine signature or other writing of a person by his own hand, as distinguished from printed or typewritten documents. The law makes the validity of many acts depend upon their being committed to writing and signed or subscribed by the party to be charged thereby, and attaches great importance to the signature to legal instruments. When handwriting is in dispute, it must often be proved by other evidence than the writing itself. When, however, any document purporting or proved to be 30 years old is produced from the proper custody, there is a presumption that the signature and every other part of it which purports to be in the handwriting of any particular person is in that person's handwriting. But the genuineness of writing not so old as this must be admitted or proved. This proof may be made by witnesses who actually saw the person write the identical words or signature or who are acquainted with the handwriting of the alleged writer, who in the last case may testify to their opinions that the writing in question was or was not written by him. Unless, however, the making of the writing in question was in fact seen by the witness, his testimony is opinion evidence, the probative force of which is quite different from that of the evidence of eyewitnesses. When the genuineness of the handwriting on any document is questioned, the opinion of any person who is acquainted with the handwriting of the alleged writer, that it was or was not written or signed by him, is admissible: (1) When the witness has seen the person write, though only once and that long ago. The value of this sort of evidence depends upon the intimacy of the acquaintance of the witness with the handwriting in question and, though admissible, is not infrequently of no probative value whatever. (2) Where the witness has received letters or other documents purporting to have been written by the alleged writer of the questioned writing or answers to others written by him or by his authority to said person. (3) When, in the ordinary course of business, writings purporting to have been written by the alleged author of the questioned writings have passed through the witness's hands. (4) When holding at the time of the alleged writing an official position, signatures or other writings of the alleged author have come before the witness. (5) When the witness has seen handwriting which the alleged author has acknowledged to be his. (6) Experts. Whenever the genuineness of the writing is in controversy in judicial proceedings, the opinions of expert witnesses who by study, occupation, or habit have become skillful in marking and distinguishing the characteristics of handwriting, are in certain cases admissible as evidence. The opinions of bank tellers, cashiers, and professional experts are admissible under this rule. The limitations and applications of the rule are involved in considerable controversy, which for lack of space cannot be here considered. The probative value of this sort of evidence may range from zero to that of a moral certainty, depending upon the nature of the case, the amount of material for comparison, the experience of the witness, and the reasons advanced in support of his opinion. The testimony of experts is entitled to the same credit and is tested by the same rules as are applied to that of other witnesses, and should have weight with the court and jury in accordance with the qualifications, ability, and experience of the witnesses. It is not, however, conclusive, but its weight is entirely for the jury.

In some jurisdictions a holographic will, by which is meant a will written entirely in the handwriting of the testator, does not require to be attested by witnesses. Such is not the general law of the United States, England, or Ireland, but is the law in Scotland, Quebec, Manitoba, and Louisiana, as well as in most of the continental states of Europe.

Typewritten documents often come in question in legal proceedings and may frequently be identified as having been written on a certain machine. Every typewriting machine, new or old, has its own peculiarities, either of style of type, defective letters, lack of alignment, angle as respects the base line, etc., which serve to distinguish it from all others, when its work is critically examined by an expert in this line of work. See HOLOGRAPH; EXPERT; EVIDENCE; FORGERY.

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HAND'Y AN'DY. A humorous Irish story by Samuel Lover (1842).

HÄNEL, hā'nel, ALBERT (1833–). A German jurist and politician, born in Leipzig. He studied at Vienna, Leipzig, and Heidelberg, in 1860 became a professor at Königsberg, and in 1863 at Kiel. One of the founders of the Liberal party in Schleswig-Holstein after the annexation of the duchies to Prussia in 1866, he was elected to the Prussian Chamber of Deputies and to the Reichstag of the North German Confederation and subsequently to the Imperial Reichstag. He became known as a leader of the so-called Fortschrittspartei, or Progressists, which, after the fusion with the Secessionists in 1884, was styled the Deutschfreisinnige Partei. Upon the break-up of the party in 1893, he represented the Freisinnige Vereinigung, but in the elections of the same year to the Reichstag he was defeated by the Social-Democratic candidate. In 1898–1903 he was again in the Reichstag. He retired to private life in 1911. He wrote *Studien zum deutschen Staatsrecht* (1873–88) and *Die Gesetzgebung des deutschen Reichs über Konsularwesen und Seeschifffahrt* (1875).

HAN'FORD. A city and the county seat of Kings Co., Cal., 30 miles south of Fresno, on the Southern Pacific and the Gulf, Colorado, and Santa Fe railroads (Map: California, F 6). It is in an agricultural and oil-producing region, has fruit-canning factories, and contains two sanitariums and a public library. Pop., 1900, 2929; 1910, 4829.

HANFSTÄNGL, hänf'shtĕng'l, FRANZ VON (1804–77). A German lithographer and photographer, born in Bayernrain. He studied lithography under Mitterer at Munich, then spent six years (1819–25) at the Munich Academy. In 1834 he founded his well-known lithographic establishment, and in the following year he was summoned by the Saxon government to Dresden to execute his great work, completed in 1852, of copying in lithograph the canvases of the Dresden Gallery. In 1844 he returned to Munich, leaving his establishment at Dresden to his brothers Max and Hans. From 1848 to 1853 he gave up lithography for galvanography and then devoted himself almost entirely to photography and later to photogravure and heliogravure. His son EDGAR HANFSTÄNGL (1842–1910) succeeded to the business in 1868. The most important publications of the house are the periodical *Die Kunst unserer Zeit*, first published in 1890, and fine collections of carbon-print reproductions, including the contents of the principal European galleries, and the *Galerie moderner Meister*.

HANGAR, hän'gär'. A shed or other structure designed for the accommodation of airships. The term is usually applied to large balloon sheds built to house dirigibles. These sheds, built in a wide variety of designs, may be of the fixed or permanent type, such as those constructed for military aëronautical establishments and for large airships (as the German Zeppelins) used for passenger service, or they may be movable, such as the portable sheds designed to shelter the airships used in military operations. The balloon sheds used for the early Zeppelins were mounted on floats which could be towed to any desired point or placed in any direction. The permanent balloon shed, which may be built of wood, iron, reënforced concrete, or other materials, presents many interesting engineering problems. In some cases it is arranged on a form of turntable, so that it may be revolved to secure the most favorable egress for the airship with the prevailing wind, as in the case of the revolving balloon shed near Biesdorf, Berlin. This, while practical, is an expensive arrangement, such installations costing as much as $350,000. Circular hangars to accommodate a number of airships have been designed, while various designs with doors at either end or with roof and sides arranged to open for the exit of the dirigibles have been attempted. A double hangar for the accommodation of two dirigibles was a favorite type in 1914. The doors alone present many interesting considerations, while the framing, covering, and anchorage facilities all must be considered. A substantial and solid structure was the permanent balloon shed at Cologne, Germany, which was protected during the German War of 1914 by rapid-fire guns mounted on the cathedral and other lofty structures in the city. This hangar was very nearly 500 feet in length, 170 feet in width, and 92 feet in height, designed to accommodate one of the huge military Zeppelins. Its double doors through which the airship emerged were 82 feet in height, each door being 24 feet wide, and susceptible of being opened by an electric motor drive in four or five minutes. Other sheds of the fixed or turntable type in Germany were located at Berlin, Potsdam, Königsberg, Posen, Kiel, Hamburg, Düsseldorf, Metz, Frankfort, Mannheim, Baden, Strassburg, Gotha, and Friedrichshafen, there being nearly 30 stations equipped in 1914. France also has many balloon sheds for its dirigibles, in 1914 stated to furnish accommodations for from 40 to 50 airships of various sizes; but in many of these the error had been made of making them too small and thus inadequate for the later dirigibles, which were approaching the Zeppelins in size.

For field work portable hangars have been developed in the Italian and other military aëronautical services, where the main arches are made up of a number of steel sections, which are fitted together and held by pins. These arches are built on the ground and are then raised to a vertical position, resting on bedplates. Each arch is bound to its neighbor by cross-brace pieces of structural ironwork, and they are successively raised with cables by means of iron poles or towers. Once the skeleton is erected, a covering material, consisting of metallized cloth, having great strength and being weatherproof, is used. The whole structure can be erected and covered within two days. The first of these portable military hangars was 270 feet in length by 100 feet in width and 80 feet in height and required 20 European freight cars for its transport. The dismounting of the balloon shed is attended with no greater difficulty than its erection, and the device has proved very successful.

For aëroplanes a large and elaborate shed is not necessary, as all that is necessary is to shelter the machine. Consequently these are of simple construction, of such durability and design as may be required by circumstances, varying from a canvas tent or a wooden or sheet-metal shed to a more permanent structure. For a discussion of German practice in the construction of balloon sheds, consult Sonntag, *Ueber die Entwicklung und den heutigen Stand des deutschen Luftschiffhallenbaues* (Berlin, 1913). See AËRONAUTICS; MILITARY AËRONAUTICS.

HANGCHOW, häng′chou′. Capital of the Chinese Province of Chekiang (Map: China, L 5). It is situated near the southern end of the Grand Canal, southwest of Shanghai, on an indentation of the East China Sea. Its walls have a circuit of 12 miles, are 30 to 40 feet high, 20 to 30 feet thick, and are pierced with 10 large gates. In 1904 a stone jetty was built at Kiahing, the port for the shipping on the Grand Canal leading up to Shanghai. The streets are tolerably wide and clean, and there are many good shops. The principal street, which runs from north to south, is 4 miles long. The west wall is washed by the famous Si-hu, or West Lake, the chief attraction of the city. It is a beautiful sheet of water, about 8 miles in circumference, dotted with islands on which are built monasteries, memorial halls, and shrines. On its west side is an abrupt but magnificent range of hills. A little farther to the west are numerous finely situated Buddhist temples to which tens of thousands of pilgrims repair daily. Hangchow has long been noted for its magnificence, its wealth, and its luxury. Marco Polo visited it several times towards the close of the thirteenth century, and describes it as 100 miles in circuit, and gives the number of its bridges as 12,000, all of them of stone. The name he gives it is *Kinsay*, a corruption of Chinese king-shï, meaning 'capital' or 'metropolis,' Hangchow having become in 1127 the capital of the Sung dynasty when the Kin Tatars conquered the northern provinces.

In December, 1896, Hangchow was opened to foreign residence and trade in accordance with a treaty made at Shimonoseki between the Chinese and Japanese in the spring of the preceding year. A foreign settlement containing 1809 *mou*, or Chinese acres, or about 300 English acres, has been laid off on the east bank of the Grand Canal about 10 li (3⅓ English miles) from the Wun-li Gate. One of the government mints is situated at Hangchow. Communication with the city can be maintained by small canals leading from the Grand Canal. Hangchow is noted for its silk, the output of which is steadily increasing, and for its fans, the making of which is an important industry. It has no direct foreign trade, all produce of native origin finding its way to Shanghai by the canal or coastwise, and foreign goods come in in the same way. The exports consist chiefly of silk, paper fans, lotus nuts, and tea, and the imports of copper and spelter from Japan for use in the mint, and of native produce, of brass buttons, leather, and tobacco. In 1912 the imports from foreign countries amounted to $2,201,000, native imports to $2,880,400, and the total exports to $10,063,000. The Ts'ien-tang River and the Grand Canal are the chief arteries of inland trade. The former is navigable at all seasons, but unfortunately is tortuous and shallow and at certain seasons of the year is subject to an "eagre," or "bore," which rises to a height of 15 feet and has a velocity of 15 miles an hour. Further it is not connected with the Grand Canal, some miles distant, and the transfer of goods and passengers is very slow, troublesome, and expensive. Many firms are engaged in the steam-launch transportation business on the canal, and the journey to Shanghai may be made in from 20 to 24 hours. A railroad to Soochow is to be built by local capital. The population of the city proper is estimated at 300,000, but the suburbs, which are properly included in the name Hangchow, are densely populated, and the whole may be set down as not far from 600,000. On Dec. 29, 1861, Hangchow was captured by the Taiping rebels after a protracted siege in which it suffered much.

Bibliography. *Marco Polo*, edited by Yule (2 vols., London, 1874; 3d ed. by Cordier, ib., 1903); G. E. Moule, *Notes on Hangchow* (1889); Scidmore, *China, the Long-lived Empire* (New York, 1900); H. B. Morse, *Trade and Administration of China* (rev. ed., ib., 1913).

HANG′FIRE′. When the powder charge of a gun fails to explode promptly upon being ignited, it is said to *hang fire.* It is due to a variety of causes, such as moisture, insufficient priming charge, etc., and is a prolific cause of accidents with modern breech-loading guns. Smokeless gunpowder is not easy to ignite, and the small priming charge of black powder sometimes fails to give out a sufficient burst of flame, in which case only a small portion of the charge takes fire, and the burning may last several seconds before the charge explodes. When several guns are being fired, the man who operates the breech may think his own has gone off and open the breech while the powder is still burning. If the gun is of large size and is not fitted with safety gear to prevent the turning of the breechblock until the gun has recoiled after fire, the premature opening of the breech may cause the death or serious injury of every one in the vicinity. See GUNS, NAVAL.

HANG′ING. The common-law mode of inflicting capital punishment. The sentence pronounced by the court indicates the method of execution, viz., that the convict "be hanged by the neck until he is dead." The time and place of the execution are also, within statutory limits, fixed by the sentence. In England, formerly, in atrocious cases, it was usual for the court to direct a murderer to be hung upon a gibbet in chains near the place where the crime was committed—also at a later period to order the body to be dissected—and the execution to take place on the next day but one after the sentence was passed. But these useless severities were abolished by the Statute 6 and 7 Wm. IV, c. 30.

The mode of punishment by hanging was first adopted in England in 1241, when Maurice, a nobleman's son, was hanged for piracy. Other more barbarous modes of inflicting death were long in use, but have been abolished, and hanging has long been the ordinary mode of executing capital punishment, in the United States as well as Great Britain. In a few of the United States electrocution (q.v.) has been substituted for hanging as a less repulsive and more humane method of capital punishment. The publicity which formerly attended the hanging of criminals has, in most civilized communities, been done away with. In treason, hanging is part of the statutory punishment, coupled with mangling the body, though the crown may change the sentence into simple beheading, except in the case of women, who are, in deference to their sex, legally exempt from the latter form of execution.

The cause of death in hanging is complex. The compression of the windpipe by the cord, the obstruction of the return of venous blood from the head, and of the flow of arterial blood to the brain, the stretching or tearing of the nervous structures of the neck, and in some instances dislocation or fracture of the vertebræ, may concur in the production of the fatal effect, which, though sometimes attended with violent struggles, is probably in most cases nearly instantaneous. See STRANGULATION; EXECUTION; CAPITAL PUNISHMENT.

Hanging, Drawing, and Quartering was, in early English criminal jurisprudence, a mode of executing the sentence of capital punishment on a traitor. It consisted in drawing the criminal to the place of execution on a hurdle and, after hanging him, dividing the body into quarters. This form of executing the sentence was substituted by statute (54 Geo. III, c. 146) for the more ancient and barbarous practice (to which the word "drawing" originally referred) of disemboweling the criminal. The more humane and decent method of execution by hanging, without the barbaric concomitants of drawing and quartering, is now employed in Great Britain as well as in the United States, in those rare cases in which treason is still punished with death.

HANGING GARDENS OF BABYLON. The name commonly given to a structure of ancient Babylon, famed as one of the seven wonders of the world. It appears to have been a sort of building on the roof of which were planted trees, flowers, and shrubs, and is said to have been constructed by Nebuchadnezzar for the gratification of his Median Queen, because the Babylonian plain seemed dreary to her in comparison with the mountain scenery of her native land. Strabo (xvi, 1, 5) says the structure was a square, four plethra in area; it rested on arches supported by hollow pillars of burnt brick, filled with earth, in which the roots of the trees were planted; the top consisted of terraces, and a force of men was constantly employed pumping up water from the Euphrates for irrigation. Ctesias, in Diodorus, ii, 10, describes the hanging gardens at length and ascribes them to Semiramis. There is also a reference to them in an excerpt from Berosus, in Josephus (*Ant.*, x, 11), and a description in Curtius Rufus (*Hist. Alex.*, v, 1). Koldewey, in the course of his excavations at Babylon, has discovered in the northeast corner of the South Palace in the mound called El Kasr a vaulted structure that in many respects corresponds to the descriptions, though the measures are smaller than those given by the classical writers, as in the case of the walls. Consult P. S. Handcock, *Mesopotamian Archæology* (New York, 1912), and Koldewey, *Das wieder erstehende Babylon* (Leipzig, 1913).

HANGING ROCK, BATTLE OF. A battle fought on the western bank of Hanging Rock Creek, S. C., on Aug. 6, 1780, during the Revolutionary War, between about 800 American militia under Colonel Sumter and an equal number of Loyalists under Major Carden. The Americans in an impetuous charge at first drove the Loyalists back from their camp, but, delaying to plunder, fell into disorder, and in consequence were themselves driven back and forced to retreat. The Loyalists lost 269 in killed, wounded, and missing. The loss of the Americans was not recorded. Consult Dawson, *Battles of the United States* (2 vols., New York, 1858), and Lossing, *Field Book of the American Revolution* (2d ed., New York, 1855).

HANGING WALL. A term used to designate the upper or covering wall of an inclined ore body, mineral vein, or stratum. If the mineral deposit be flat, the term *roof* is used. In mining it is sometimes necessary to support the hanging wall either by pillars of ore or masonry or by props of wood. See FOOTWALL.

HANG′NEST′. A name often used in books, for the birds of the American family Icteridæ, sometimes called troupials, but more usually orioles, all of which build pensile nests. (See NIDIFICATION; ORIOLE.) The Baltimore oriole is the most familiar North American representative of the family, and is commonly known as hangbird in certain localities.

HANGUL, hŭn′gōōl (native name). The Kashmir stag (*Cervus kashmirianus*), which closely resembles the red deer (see DEER) of Europe, of which it was formerly considered to be only a local race. The antlers differ from those of the European stag in not forming a cup at the crown, which is simply forked. It is a forest-haunting animal and in summer remains at elevations between 9000 and 12,000 feet, but in winter is driven down into the valleys by snow. The proper shooting season is in October and November, when the stags are full-antlered and seeking the does. They roam widely.

HANIFAH, hȧ-nē′fȧ, or **ABU HANIFAH.** See Abu Hanifah.

HANKEL, häṉ′kel, Hermann (1839–73). A German mathematician, son of Wilhelm Gottlieb Hankel, born at Halle. He studied at Leipzig and at Göttingen under Riemann and Möbius, became privatdocent in mathematics at Leipzig in 1863, and professor extraordinary in 1867, and in the same year was called to Erlangen in the same capacity. His chief works were: *Zur allgemeinen Theorie der Bewegung der Flüssigkeiten* (1861); *Vorlesungen über die komplexen Zahlen und ihre Funktionen* (1867); *Die Entwickelung der Mathematik in den letzten Jahrhunderten* (1869; 2d ed., 1884); *Zur Geschichte der Mathematik im Altertum und Mittelalter* (published posthumously, 1874); *Die Elemente der projektivischen Geometrie in synthetischer Behandlung* (also posthumous, 1875). For his biography and an estimate of his works, consult Zahn, "Einige Worte zum Andenken an Hermann Hankel," in the *Mathematische Annalen* (Leipzig, 1874).

HANKEL, Wilhelm Gottlieb (1814–99). A German physicist. He was born at Ermsleben and studied physics and chemistry at the University of Halle, where he later was appointed professor. In 1849 he became professor of physics at Leipzig and served there until 1887, when he was forced to give up active duties. He devoted himself to the study of thermoelectric properties of crystals and made many interesting discoveries in this field. Hankel's researches are published for the most part in Poggendorff's *Annalen* (Leipzig) and the *Berichte* and *Abhandlungen* of the Saxon Academy of Sciences. He also prepared a German edition of Arago's works, which was published at Leipzig (1854–60).

HAN-KIANG, hän′kyäng′. The name of several rivers of China, the most important of which is that which flows into the Yang-tse at Hankow (q.v.). It rises in the mountains in Shensi, known as Ta-pa-ling (sometimes also called Kiu-tiao Shan, the 'mountain of nine ridges'), and flows east and south through the provinces of Shensi and Hupeh for a distance of about 1300 miles, for 1260 of which it is navigable in some degree. Its upper courses are through a mountainous region, and rapids are both numerous and dangerous. In certain seasons floods are common, the water rising in the narrower parts with great suddenness, sometimes to a height of 24 feet in as many hours. On such occasions the rapids are wiped out, and the river becomes a raging torrent. From Sinpuwan, the limit of navigation, to Tziyanghien (400 miles), only small boats can be used. At the latter place goods and passengers are transshipped to larger craft, subject to a second transshipment at Laohokou (400 miles) or Fancheng (450 miles) to the ordinary river junk of the Han. At Laohokou the country opens out, and for the remaining 460 miles to Hankow navigation is easy, though shallows and shifting banks abound. The traffic on the river is considerable, and with a little dredging it is capable of being used by steamers of light draft as far as Fancheng or Laohokou, the two most important trading centres on the river. Other cities besides those already mentioned are Hingan, a large walled city on the right bank, with a great military depot in the vicinity, and Siangyang (also on the right bank), a quiet walled city opposite Fancheng, both of which are noted for the long and stubborn resistance (1268–73) which they offered to the Mongol armies of Kublai Khan. (Consult Yule-Cordier, *Marco Polo*, vol. ii, London, 1903.) Prior to 1470 the river branched off from its present course about 3 miles above its present mouth, flowed through the plain behind what is now the foreign settlement of Hankow, and entered the Yang-tse some miles lower down. In that year it suddenly changed its course and poured its waters into the Yang-tse through its present channel.

HANKIN, hăṉ′kĭn, Ernest Hanbury (1865–). An English bacteriologist, born in Ware, Hertfordshire. He was educated at Merchant Taylors' School, at University College, London, St. Bartholomew's Hospital, and St. John's College, Cambridge, and worked under Koch in Berlin and with Pasteur in Paris. In 1892 he became chemical examiner and bacteriologist to Agra and Oudh in India, and he organized an important research laboratory in Agra. He did particularly valuable work on cholera and on the plague (which he thought was sometimes carried from rats by ants) and wrote on these subjects in technical journals. His *Cause and Prevention of Cholera* was printed at Allahabad in 13 languages. He also wrote *Animal Flight: A Record of Observation* (1913).

HANKIN, St. John Emile Clavering (1869–1909). An English dramatist, born at Southampton. He was educated at Malvern College and at Oxford University. Besides his contributions to *Punch*, the *Times*, the *Saturday Review*, and the *Indian Daily News*, he is author of *Mr. Punch's Dramatic Sequels* (1901) and *Lost Masterpieces* (1904). His plays include: *The Two Miss Wetherbys* (1903); *The Return of the Prodigal* (1905), his best-known production; *The Charity that Began at Home* (1906). *The Dramatic Works of St. John Hankin,* with an introduction by John Drinkwater, appeared in three volumes in 1912.

HANKOW, hän′kou′ (Chin., Han-mouth). An important river port and commercial centre of China, situated in the very heart of the country, 600 miles from the sea, on the left bank of the Yang-tse, at the point where it is joined by the river Han in lat. 30° 32′ N., long. 114° 19′ E. (Map: China, K 5). It occupies the angle formed by the junction of these two rivers stretching along the east or left bank of the Han for over 2½ miles, and eastward along the left or north bank of the Yang-tse for 1 mile. Its streets are narrow, crooked, and dirty, and usually much crowded with the screeching, heavily laden wheelbarrows used in the conveyance of the enormous quantities of goods which here find their point of transshipment. Adjoining the native town on the east is the foreign settlement, originally a British concession, but thrown open to all foreigners by the British government shortly after the opening of the port in 1861. It extends along the Yang-tse for a distance of about 800 yards, a wide "bund," or esplanade, running along its entire length. It has fine streets, kept in splendid condition by a municipal council elected by the land renters. Ground rent is paid to the Chinese authorities through the British Consul. The houses and business buildings are substantial and are in marked contrast with those of the native town.

To the east of this lie the "concessions" more recently acquired by the French, Russians, and Germans, and the foreign water front has now a length of nearly 3 miles. Another new "concession" has been opened by the Chinese authorities on the south or Wuchang side of the Yang-tse, where foreigners may build business places and residences on certain conditions.

West of the native town, and across the Han, is the city of Hanyang, to which Hankow is subordinate, and directly across the Yang-tse from Hanyang stands the large and imposing city of Wuchang, capital of the Province of Hupeh, and formerly the seat of the Governor-General (or Viceroy) of the two provinces of Hunan and Hupeh, unitedly known as Hukwang, or Liang Hu (i.e., the two Hu). These three centres of population are included in the port and customs district of Hankow, and, situated as they are in the centre of an unsurpassed network of rivers and lakes, they form the most important commercial centre of the country. Their total population is estimated at 1,500,000, of which Hankow has 826,000, or more than half.

Hankow is the first of the great commercial emporiums of the country. Its industries include cotton, hemp, and flour mills, a tannery, a mint, and ore-crushing works in Wuchang, an arsenal, iron and steel works in Hanyang, and down the river are great tanks for storing oil (capacity, 5000 tons), which is tinned on the premises. The mouth of the Han swarms with native shipping, and the scene presented everywhere is one of great commercial activity. Regular steam communication is maintained with Shanghai and the other river and lake ports both above and below Hankow, Ichang, about 500 miles above Hankow, being the limit of steam navigation westward. The largest ocean steamers come to Hankow and load at great hulks moored off the river bank. The Yang-tse, opposite the foreign settlement, is 1400 yards wide from brink to brink. In winter its average low-water depth is 40 feet in mid-channel, but in summer, when the rivers are in flood, the swollen waters frequently rise 50 feet to the brink of the bund, sometimes overflowing it, inundating the town. To obviate this evil and to reclaim low-lying land near the city, an embankment was completed in 1905 from the Han River to Seven Mile Creek. The embankment is 13 miles long, and from 12 to 33 feet high. Fifty square miles of land have thus been reclaimed.

Net foreign imports, net native imports, exports, and total trade have been valued as follows in haikwan taels:

	IMPORTS		Exports	Total
	Foreign	Native		
1909..	37,788,240	15,360,625	72,147,825	125,296,690
1910..	37,802,574	14,414,844	83,081,749	135,299,167
1911..	33,966,394	9,916,543	74,074,547	117,957,484
1912..	40,204,778	12,122,964	82,704,437	135,032,179

The average value of the haikwan tael in 1909 was 63.4 cents; in 1910, 66 cents; in 1911, 65 cents; at the end of 1912 it was valued at 75.3 cents. The net importation of opium declined from 306 piculs in 1906 to 56 piculs in 1911. The principal export is black tea; other large exports are hides, beans, vegetable wax, cotton yarn, and raw silk. The leading imports include metals, machinery, and piece goods.

Hankow is one of the principal stations of the great trunk railway which is to connect Peking in the north with Canton in the south. The Hankow-Peking section was opened in December, 1905, and is doing a large and expanding business. The Hankow station is a few miles below the foreign settlement, but a branch with the necessary stations runs to the Han behind the foreign settlements. Hankow and the neighboring cities were all but destroyed during the Taiping Rebellion. In 1911 the city was attacked by the revolutionists and partly burned. Yuan Shi-k'ai was sent by the Emperor to learn the extent of the damage. In 1912 the city was captured by the revolutionists and made the provisional capital. (See HANYANG and WUCHANG.) Consult: Scidmore, *China, the Long-lived Empire* (New York, 1900); T. R. Jernigan, *China in Law and Commerce* (ib., 1905); H. R. Burrill, *Report on Trade Conditions in China* (Washington, 1906); H. B. Morse, *Trade and Administration of China* (rev. ed., New York, 1913).

HANLAN, hăn′lan, EDWARD (1855–1908). A Canadian oarsman. He was born in Toronto, Ontario, and at 16 years of age began to distinguish himself as an oarsman. In 1873 he rowed his first race in shells, beating two opponents. In August, 1876, he won the championship belt of the Toronto Rowing Club, and in September of the same year the single-scull championship at the Centennial Regatta, Philadelphia, beating seven of the best-known oarsmen. The time of the final heat was 21.09 minutes, then the record for 3 miles with a turn. From 1876 to 1884 Hanlan was never beaten, except in 1880, when he retired at the stake boat on account of sudden illness due to a previous accident. During 1876–84 he won 15 races, gaining successively the championships of America, England, and the world, all of his opponents being of championship rank. In 1884 he went to Australia and was beaten by Beach. For some years he was coach to the crew of Columbia University, New York. He died in Toronto.

HANLE, hän′lĕ, one of the highest inhabited places in the Ladak District, Kashmir, British India (Map: India, D 2). It is in lat. 32° 48′ N. and is 15,075 feet above sea level. There is a Buddhist monastery. Some barley is raised in the valley, which is 8 miles long and incloses a lake.

HAN′LEY. A manufacturing town and municipal borough in Staffordshire, England, on the North Staffordshire Railway, and on a branch of the Trent and Mersey Canal, 2½ miles from Newcastle under Lyme (Map: England, D 3). It is known as the Metropolis of the Potteries and is famous for its manufactures of earthenware and fine porcelain. It has coal and iron mines, iron furnaces and foundries, and brickworks. The principal portion of the town is on an elevated site; the streets, wide and regular, are brick-paved, and there are many handsome residences. The chief buildings are the town hall, mechanics' institute, museum, infirmary, national and board schools. There is a fine park. The town owns an electric-light plant and maintains markets, baths, a cemetery, a free technical museum, and free libraries. It utilizes its sewage for the manufacture of fertilizers. Hanley's rise dates from the inception of the pottery industry. It has absorbed the former township of Shelton, and it received a municipal constitution in 1857. Pop., 1891, 55,000; 1901, 61,500; 1911, 66,255.

HANLIN-YÜAN, hän-lēn′ yü-wän′ (Chin., College of the Forest of Pencils). The National

Academy of China, membership in which used to be the highest literary honor China had to bestow on her scholars. It was founded by the Emperor Hüan-tsung in 725, first as a coterie of scholars and poets whose society he courted, then as a learned body of copyists engaged in multiplying books. Loyang, in Honan, then the capital, was its home; since then it has shared the fortunes of successive dynasties and has been in Peking since 1403. During the "Boxer" trouble of 1900 its domicile was purposely burned. Its members were the historiographers of the country, the compilers of its great encyclopædias, editors and commentators of its classics, etc., and had charge of literary matters in general, or were drafted off to the provinces as superintendents of education, literary chancellors, etc. Its membership was made up of honor men at the triennial examinations at Peking. Consult Martin, *Hanlin Papers* (New York, 1880).

HAN'MER, Sir Thomas (1677–1746). An English statesman and scholar. He was educated at Westminster and at Christ Church, Oxford, was elected several times (1701–27) to Parliament, and in 1713 became Speaker of the House of Commons. He retired from politics in 1727 and devoted himself to literature. He published (1743–44) an edition of Shakespeare, with illustrations by Gravelot—a work of no critical value, but of splendid typography. Pope, in the *Dunciad*, alludes to him under the name *Montalto* (bk. iv, 105).

HANN, hân, Julius von (1839–). A German physical geographer and meteorologist, born near Linz (Upper Austria). He was educated at the University of Vienna, became a lecturer there on meteorology in 1868, and in 1873 professor of physical geography. Having held a professorship at Graz from 1897 to 1900, he returned to Vienna in the latter year to occupy the chair of cosmic physics. In 1866 he established with Jelinek the *Zeitschrift der oesterreichischen Gesellschaft für Meteorologie*, and in 1877 was appointed director of the Central-Anstalt für Meteorologie und Erdmagnetismus of Vienna and elected to the Academy of Sciences. His researches dealing with such questions as the theory of storms, the decrease of temperature attendant upon increased elevation, and the violent south wind known to the Swiss as the foehn, are extensive. He retired from the directorship of the Central-Anstalt in 1897 and from his professorship in 1910. His publications include: "Astronomische Geographie und Physik der Erde," for the *Allgemeine Erdkunde* (4th ed., 1886) of Hochstetter and Pokorny; *Handbuch der Klimatologie* (3 vols., 1883; 3d ed., 1908–11); *Die Temperaturverhältnisse der oesterreichischen Alpenländer* (1887); *Lehrbuch der Meteorologie* (1901; 3d ed., 1914).

HAN'NA. The usual name in British Guiana for the hoatzin (q.v.).

HANNA, Marcus Alonzo (1837–1904). An American merchant and politician, born at Lisbon, Columbiana Co., Ohio, of Scottish-Irish parentage. In 1852 his father removed with his family to Cleveland, Ohio, where he established himself in a wholesale grocery business that soon became one of the most extensive in northern Ohio. Young Hanna was educated in the Cleveland public schools, and began a course at Western Reserve University, but, having been suspended in April, 1858, he was permitted to enter into business with his father's firm, and about the time of his father's death, in 1862, he became one of the partners. In 1867 he and his brother-in-law, Robert R. Rhodes, became members of the new firm of Rhodes & Co., which was joined by Mark's youngest brother in 1875 and about the same time by another brother-in-law, James Ford Rhodes the historian. In 1885, the Rhodes brothers having withdrawn, the firm name became M. A. Hanna & Co. At first the business of the firm consisted chiefly in mining and selling coal, but, as its operations were developed, largely under Mark's initiative, it became a selling agency for coal, iron ore, pig iron, and a variety of other products; acquired an interest in numerous mines and furnaces; and established a lake transportation service with ships constructed in its own shipyards. Prior to 1880 the firm's business engaged nearly all of Hanna's activities, but subsequently he became actively interested in Cleveland newspapers, theatrical enterprises, and street railways, and in banking and railways. About the same time, too, he turned his attention to politics, gradually extending his influence from his home ward to city, State, and finally to national politics. In 1880 he was an active Republican worker in Cleveland; in 1884 he was a delegate to the Republican National Convention, and in 1888 he was again a delegate to that body, and this time made himself known as one of the managers of John Sherman's canvass for the nomination. In 1896 he suddenly acquired national prominence by the part he took in securing the nomination of William McKinley for the presidency at the Republican National Convention at St. Louis. Immediately after the convention he became chairman of the Republican National Committee and, conducting the campaign on the same principles that had won him success in business, secured the election of McKinley by the largest popular plurality given up to that time at a presidential election. In March, 1897, Governor Bushnell appointed him United States Senator from Ohio to succeed John Sherman, who had resigned to become Secretary of State in President McKinley's cabinet, and in the following year he was chosen by the Legislature Senator for the full term of six years. In the Senate he did not take a prominent part either as a debater or a legislator; but up to the death of President McKinley he was recognized as one of the most influential advisers of the administration, and in the Roosevelt administration he was a strong leader of the party favoring the Panama as against the Nicaraguan route for the interoceanic canal. Actively interesting himself in the problem of the relation between capital and labor, in 1901 he was made chairman of the committee of conciliation of the National Civic Federation, and in this capacity he was largely instrumental in effecting a settlement of the anthracite-coal strike in 1902. Consult Croly, *Marcus Alonzo Hanna: His Life and Work* (New York, 1912).

HANNA, William (1808–82). An English clergyman, author, and editor, born at Belfast. He studied at the universities of Glasgow and Edinburgh and was ordained a minister of the Church of Scotland. Upon the establishment of the Free church of Scotland in 1843 he, with his entire congregation, withdrew from the state church and formed, at Skirling, a Free church society. From 1850 to 1866 he was the colleague of Thomas Guthrie (q.v.) at St. John's Free Church, Edinburgh. He was appointed editor of the *North British Review* in 1847, but soon resigned, and wrote numerous works, of which the *Last Day of Our Lord's Passion* (1863) had a wide circulation. He is, however, best known for his edition of *The Posthumous Works of Thomas Chalmers* (9 vols., 1847) and his *Memoirs of the Life and Writings of Thomas Chalmers* (4 vols., 1849–52).

HAN'NAHILL'. A local name for the black sea bass (*Centropristes striatus*). See SEA BASS.

HAN'NAY, DAVID (1853–). An English journalist and author, born in London. Besides work on the *Pall Mall Gazette*, the *Saturday Review*, and *St. James's Gazette*, Hannay wrote several books, mostly connected in some way with the navy: *Short History of the Royal Navy* (1898); *Admiral Blake* (1888); *Rodney* (1891); *Life of Marryat* (1889); *Life of Smollett* (1887). To the "Public Men of To-Day Series" he contributed *Don Emilio Castelar* (1896), and to the "Periods of European Literature," *The Later Renaissance* (1898), his most elaborate work in literary history. In 1913 appeared his *Navy and Sea Power.*

HANNAY, JAMES (1827–73). A British journalist and novelist, born at Dumfries, Scotland. He entered the navy in 1840, but five years later was court-martialed and dismissed from the service for writing satirically of his superiors. He then served as a reporter for the *Morning Chronicle;* worked on two short-lived comic papers, the *Pasquin* and the *Puppet Show;* and from 1860 to 1864 was editor of the Edinburgh *Evening Courant.* While British Consul at Barcelona (after 1868), he contributed a series of widely read letters to the *Pall Mall Gazette,* "from an Englishman in Spain." He wrote two naval novels, *Singleton Fontenoy* (1850) and *Eustace Conyers* (1855), which constitute his best work. He is also author of *Hearts Are Trumps* (1848); *King Dobbs* (1849; new ed., 1856); *Sketches in Ultramarine* (1853); *Satire and Satirists* (1854); *Sand and Shells* (1854); *Essays from the Quarterly Review* (1861); *Character and Criticisms* (1865); *A Course of English Literature* (1866); *Studies on Thackeray* (1869).

HANNAY, JAMES (1842–1910). A Canadian journalist and historian. He was born at Richibucto, New Brunswick, worked on newspapers in St. John while studying law, and, having been called to the bar (1867), was for six years official reporter of the Supreme Court of New Brunswick. He was afterward connected editorially with the St. John *Daily Telegraph* (until 1883), the Montreal *Daily Herald,* and the Brooklyn *Eagle.* In 1888 he became editor of the St. John *Gazette* and in 1893 editor of the *Telegraph.* He lectured frequently on historical subjects, was a notable editorial writer, contributed in prose and verse to magazines, and wrote much on Canadian history. His style is clear and graceful, and in general his attitude is impartial; but he betrays the bias of a loyalist in his treatment of the War of 1812. His narrative of Acadia under the French régime dispels much of the sentimental haze due to the poetized story of Evangeline. His principal publications are: *The Captivity of John Gyles among the Milicetes* (1875); *History of St. John* (1875); *History of Acadia* (1879); *New Brunswick: Its Resources and Advantages* (1902); *History of the War of 1812* (1905); *Wilmot and Tilley* (1907), in the "Makers of Canada Series"; *History of the Queen's Rangers* (1908); *History of New Brunswick* (1909).

HANNAY, JAMES OWEN ("GEORGE A. BIRMINGHAM") (1865–). An Irish novelist, born in the north of Ireland, the son of a Belfast clergyman. He was educated at Haileybury, England, and at Trinity College, Dublin, took orders, and became rector at Westport in 1892. In 1912 he was made a canon of St. Patrick's Cathedral, Dublin. In 1914 he visited the United States. His novels are in two classes—the one including such serious and penetrating studies of contemporary Ireland as *The Seething Pot* (London, 1905; New York, 1912), *Hyacinth* (1906), *The Red Hand of Ulster* (1912), and *Northern Iron* (1913); and the other embracing notably such stories and sketches of light and more or less fantastic comedy as *The Lighter Side of Irish Life* (1912), *The Major's Niece* (1912), and *Spanish Gold* (1911). His earlier novels introduce, incognito but easily recognizable, many Irishmen prominent in literature or politics, among them George Moore, Standish O'Grady, and Sir Horace Plunkett. Canon Hannay's serious work, a careful transcript of the actualities of Irish life, throws an interesting light upon the contemporary history of Ireland, and the irony, satire, drollery, fantasy, and extravagance of his lighter fiction afford a good quality of literary entertainment. In 1913 appeared his *Adventures of Dr. Whitty* and *Irishmen All,* the same year seeing the performance of *General John Regan* in London and New York; and in 1914 he published *The Bad Times* and *From Dublin to Chicago.*

HAN'NIBAL. A city in Marion Co., Mo., 120 miles by rail northwest of St. Louis, on the Mississippi River, and on the St. Louis and Hannibal, the Chicago, Burlington, and Quincy, the Wabash, and the Missouri, Kansas, and Texas railroads (Map: Missouri, E 2). It has steamboat communication with various cities on the river; a large trade in lumber, tobacco, flour, and agricultural produce, and manufactures of lumber, foundry products, wagons, scrubbing machines, scouring powder, woodenware, shoes, car wheels, cigars, cement, and lime. Among the features of the city are the public library, the Federal building, the city hall and other municipal buildings, the city hospital, the high-school building, Riverview Park (comprising 120 acres), St. Mary's Academy, and a long iron and steel railroad and wagon bridge across the river. Settled in 1819, Hannibal was incorporated as a town in 1839. The government is conducted under a charter of 1845, revised in 1873. The mayor, biennially elected, controls appointments to the administrative departments, those to the library board and finance committee alone being ratified by the council, which is unicameral. The school board is chosen by the people. The city owns and operates its water works and electric-light plant. Mark Twain lived here in his boyhood, and his home is the property of the city. Pop., 1900, 12,780; 1910, 18,341; 1914 (U. S. est.), 20,710.

HANNIBAL (Phœnician, grace of Baal, Gk. Ἀννίβας, *Annibas*). A common name among the Carthaginians; the list of Hannibals famed in history extends to 14 or 15. The greatest of all was the Hannibal (c.247–c.183 B.C.) of the Second Punic War, the son of Hamilcar Barca. (See HAMILCAR, 7.) When he was nine years old, he accompanied his father on his Spanish expedition. Before starting he swore an oath of eternal hatred to the Romans, which he kept through his life. After the death of Hamilcar he was employed by Hasdrubal, his brother-in-law, in most of his military operations. When Hasdrubal was assassinated (221), the army with one voice elected Hannibal commander in chief—an appointment which the authorities at Carthage at once ratified. Hannibal longed to strike a death blow at his country's rival by attacking her on her own soil. But before he entered on a task of such magnitude he deemed it prudent to complete the subjugation of Spain and accordingly spent two years in contests with some tribes hitherto independent of Carthage. Saguntum, a city in alliance with Rome, was attacked by him on the ground that its inhabitants were making aggressions on subjects of Carthage. After a siege of eight months the city was taken, and the Romans, after an embassy had unsuccessfully demanded the surrender of the general who had thus, they claimed, violated the existing treaty between Rome and Carthage, declared war in 218 B.C. Having taken measures for the defense of Africa and Spain during his absence, Hannibal started from New Carthage, in Spain, in 218 B.C., with 90,000 foot and 12,000 horse. This force was much thinned by his contests with the tribes between the Iberus and the Pyrenees, by the necessity of leaving Hanno with 11,000 men to keep those tribes in subjection, by desertion in the passage of the Pyrenees, and by his sending home a portion of his Spanish troops. His object in this last act was to inspire the remaining soldiers with thorough confidence in themselves and their general. From the Pyrenees he marched to the Rhone without opposition, since Scipio was at Massilia, four days' march from the point where Hannibal crossed the river in the face of the Celtic hordes who sided with the Romans. His next great difficulty was the passage of the Alps, which he effected in 15 days, in spite of the attacks of the mountain tribes, snows, storms, and other difficulties. Much discussion has taken place as to whether Hannibal crossed the Alps by the pass of Mont Genèvre or by the pass of Little St. Bernard, or by Mont Cenis. For the first route, Michelet, Thierry, and most French writers have argued; and for the Little St. Bernard Pass, Niebuhr, Arnold, Mommsen, and others; for Mont Cenis, Osiander, *Der Hannibalweg* (Berlin, 1900), and, in effect, Azan, *Annibal dans les Alpes* (Paris, 1902), and Wilkinson, *Hannibal's March through the Alps* (Oxford, 1911), who argue for the Col du Clapier, which is but a few miles southwest of Mont Cenis. For other recent discussions, consult: Fuchs, *Hannibals Alpenübergang* (Vienna, 1897); Marindin, in the *Classical Review*, vol. xiii (London, 1899); Fuegner, *Livius Hilfsheft* (Leipzig, 1901); Colin, *Annibal en Gaule* (Paris, 1904); Hesselmeyer, *Hannibals Alpenübergang im Lichte der neueren Kriegsgeschichte* (Tübingen, 1906).

After allowing his army (now about 26,000 strong) some time to recruit in the rich villages of the friendly Insubrians, he first subdued the Taurini, a tribe hostile to the Insubrians, and took their chief city after a siege of three days, and thus forced into alliance with him all the Ligurian and Celtic tribes on the upper course of the Po. Scipio, having returned from Massilia, took the command of the army in the north of Italy and met Hannibal on the plain near the river Ticinus. The Romans were entirely routed, and Scipio, who was severely wounded, retreated across the Po. The armies again met at the Trebia with a like result, though the Romans, who had received reënforcements, were much more numerous. These battles were fought in 218 B.C. Having wintered in the neighborhood of the Po and having levied additional troops among the Gauls, most of whom were now his friends, Hannibal started southward as soon as spring permitted, marching through Liguria and the swamps of the Arno. In this difficult route immense numbers of his beasts of burden and horses perished, and he himself lost the sight of one eye. He next inflicted a severe defeat, near Lake Trasimenus, on the consul Flaminius. After this victory he crossed the Apennines to Picenum and Apulia and thence recrossed to the fertile Campania, which he ravaged. Thither Fabius Maximus Cunctator was sent with an army to oppose him, but no general engagement took place, since the consul, playing for time in which Rome might recover from her reverses, endeavored to lead Hannibal into snares, which he succeeded in doing; but the Carthaginian extricated his army by a stratagem and returned to Apulia. He wintered at Cannæ and in June, or, according to others, in August (2) of 216 B.C., almost annihilated a Roman army of 90,000 men under Terentius Varro and Æmilius Paulus, in the battle which was fought a little below the town. (See CANNÆ.) About 50,000 are said to have fallen, including Æmilius Paulus and a host of Roman knights, senators, and other distinguished persons. Here Hannibal committed, in the opinion of some critics, the greatest military error of his life, in not marching direct to Rome; but it is supposed that he refrained in order to allow the tribes of Italy to declare in his favor. He needed, however, reënforcements, which the home government refused to send, and he lacked siege engines. Many in the south of Italy did attach themselves to his interests, but not in such numbers as he had anticipated. Indeed, it was the loyalty of the peoples of Italy to Rome that frustrated Hannibal's plans and nullified his victories. After some delay he marched on Neapolis (Naples), which he did not succeed in taking; but the gates of Capua were opened to him, and here he wintered. The enervating effect which the luxury of Capua is said to have had on his army has been greatly overdrawn; but his residence there forms, in one point of view, the turning point in the war, which from this time became more desultory in nature. Hannibal's great purpose was to arm the Italian nations against Rome and so to crush her power by means of her own subjects; the Romans, on the contrary, adopting at last the tactics of Fabius Cunctator, henceforth avoided coming to a pitched battle with the Carthaginians, but sought rather to keep the tribes in awe and to harass Hannibal and his lieutenants by small armies in different parts of the country. Hannibal traversed Italy in all directions, surprised the Roman generals, defeated their armies, and captured their towns, such as Casilinum, Arpi, Tarentum, Metapontum, Thurii, Locri, and many others; he defeated Sentenius near Capua, Cn. Fulvius at Herdonea, Fulvius Flaccus on the Anio, Crispinus and Marcellus in Lucania, and the besieging army before Locri. In all these cases the Roman armies were almost annihilated. However, the defeat of Hasdrubal, his brother, at the river Metaurus, and the loss of his army (207 B.C.; see HASDRUBAL, 3), compelled Hannibal to confine himself to the mountainous peninsula of Bruttii, where for four years he resisted all the efforts of the Romans to dislodge him. At length, after having maintained himself in Italy for upward of 15 years, he was recalled to Africa, to defend his country against Scipio Africanus Maior; but, notwithstanding his utmost exertions and the bravery of his veteran troops, he was defeated by Scipio near Zama, with a loss of 20,000 men (202 B.C.). Peace was concluded in the following year (201 B.C.).

Hannibal's scheme of overthrowing Rome had been baffled, but his hatred of Rome was not diminished, and he set himself to make preparations for a still more deadly struggle. He turned his attention in the first place to political reforms at Carthage and made some constitutional changes by which he placed the finances of the city on a better footing. But his enemies accused him to the Romans of stirring up Antiochus the Great of Syria to make war on them, and when ambassadors came to Carthage, Hannibal fled to the court of Antiochus at Ephesus. In the war which followed he took no conspicuous part, but the King bitterly regretted afterward that he did not take the advice of Hannibal to carry the war into Italy. When peace was concluded, the surrender of Hannibal was one of the conditions; but, foreseeing such a result, he fled to Prusias, King of Bithynia, for whom he gained a naval victory over Eumenes, King of Pergamus. His surrender was at length demanded by the Romans, and, seeing no hope of escape, he took poison, which he always carried with him for such an emergency.

Our information about Hannibal is derived largely from Livy (books xxi–xxx), Polybius (books iii-xv), Plutarch, Appian, Cornelius Nepos, and Zonaras. Consult: Morris, *Hannibal* (New York, 1897); Dodge, *Hannibal* (Boston, 1891); Hennebert, *Histoire d'Annibal* (3 vols., Paris, 1870–91); Grassi, *Annibale giudicato da Polibio e Tito Livio* (Vicenza, 1896); How, *Hannibal and the Great War between Rome and Carthage* (London, 1899); Lehmann, *Die Angriffe der drei Barkiden auf Italien* (Leipzig, 1905).

HAN'NINGTON, JAMES (1847–85). An English missionary, first Bishop of Eastern Equatorial Africa, born at Hurstpierpoint, near Brighton. He was educated at Oxford and entered the ministry of the Established church. He offered himself to the Church Missionary Society and in 1882 went out to reënforce the missionaries already in Uganda; but his health gave way, and he was compelled to go back to England. Two years later he was consecrated Bishop of Eastern Equatorial Africa and started a second time for Africa. After having conquered the many obstacles and perils which he encountered in his attempt to reach the interior, he was murdered by the command of Mwanga, King of Uganda, near Lake Victoria Nyanza. Consult: his *Last Journals* (London, 1888); Dawson, *James Hannington, First Bishop of Eastern Equatorial Africa* (ib., 1887); Berry, *Bishop Hannington* (New York, 1908).

HAN'NO (Phœnician, merciful) (c.755–c.715 B.C.). King of Gaza (q.v.). He is called Hanunu, or Chanun, in the inscriptions of the Assyrian King, Tiglath-pileser III; and this name has been identified with that of the Carthaginian family, Hanno, who possibly were his descendants. He was situated between Assyria and Egypt and in 732 rebelled against Tiglath-pileser, but fled without giving battle. Against Sargon II he allied himself with Sabaco (biblical So), King of Egypt, was defeated with him at Raphia (720), and carried into captivity.

HANNO. A common name among the Carthaginians. 1. The earliest of note who bore the name was a Carthaginian admiral who was sent on a voyage of discovery and colonization along the west coast of Africa, which he explored as far as the modern Sierra Leone, about 500 B.C. He founded a number of towns and on his return deposited an account of his voyage in the temple of Moloch at Carthage. This account was translated into Greek; and the translation, known as Ἄννωνος Περίπλους, or *Voyage of Hanno*, is still extant. There is an old English edition and translation by Falconer (London, 1797). Consult: Mer, *Mémoire sur le Périple d'Hannon* (Paris, 1888); Bunbury, *History of Ancient Geography* (2d ed., vol. i, London, 1883); C. T. Fischer, *De Hannonis Carthaginiensis Periplo* (Leipzig, 1893); Illig, *Periplus des Hanno* (Dresden, 1899). 2. HANNO (?–264 B.C.). A Carthaginian admiral in the First Punic War. In command of a Carthaginian fleet, near Messana, Hanno allowed the city to fall into the hands of the Romans. He was recalled and executed. 3. HANNO (third century B.C.). A Carthaginian general, successor in command to the above. He was the son of a Hannibal; with Hiero II he besieged Messana, but was defeated by the consul Appius Claudius. 4. HANNO (c.300–c.250 B.C.). A Carthaginian general in the First Punic War. He was defeated near Agrigentum in 262. In 256, with Hamilcar, he was defeated in a naval battle off Ecnomus. 5. HANNO THE GREAT (c.275–c.195 B.C.). A Carthaginian politician. At the outbreak of the revolt of the Carthaginian mercenaries after the First Punic War, a revolt due to his activity in causing the government to deny to the soldiers the rewards promised to them by Hamilcar Barca (q.v.), he was put in command of the army, but was so badly defeated that Hamilcar was sent out to share the command with him. The two agreed so ill that the home government decided on a single command, but left the choice to the army in the field, which chose Hamilcar. Hanno tried to break down Hamilcar's power, after his death opposed intrusting the chief command to Hannibal, urged the surrender of Saguntum to Rome, and was head of the peace party. After Hannibal's defeat at Zama, Hanno was one of the commissioners who were sent to Scipio to sue for peace. At the close of the Second Punic War he became leader of the party which was friendly to Rome. 6. HANNO (latter half of third century B.C.). A Carthaginian lieutenant of Hannibal. He was in command of the left wing at the battle of Cannæ (q.v.), conquered several towns in Lucania and Bruttium, and was defeated by Tiberius Gracchus (214 B.C.) near Beneventum.

HANOI, hä'nō-ē' (Chin. *Ho-nei*, within the river). One of the most important cities of Annam, capital of the Province of Tongking, and the seat of the government of French Indo-China (Map: French Indo-China, E 2). It is picturesquely situated in a region of lakes and trees, on the right bank of the Songkoi, or Red River, which rises in the Chinese Province of Yunnan, and enters the China Sea 110 miles below Hanoi. The native town lies between the citadel and the river. The streets are fairly wide and the houses good, many of them being of brick and well built. Even the native city is well kept and clean. Summer begins in April and winter about October; the highest temperature is 35° and the lowest about 6° Centigrade. Since coming under French control the part nearest the water front has been much improved; new wide streets lined with trees have been opened, lighted with electricity. They have been given French names, and in this part the principal shops and hotels are found. There are two first-class hotels, a theatre, a museum, a hospital, and imposing official buildings and residences. French missionaries have long resided here, and a two-towered cathedral is a conspicuous feature of the landscape. In the middle of this newer part of the city is a small lake nearly half a mile square, containing little islands filled with pagodas and surrounded by promenades; and on the shore of Grand Lake, in the neighborhood of the city, is a Buddhist temple with a colossal bronze figure of Buddha. In the space near the water front is a bronze statue of Paul Bert, unveiled July 14, 1900. Hanoi was fortified by French officers at the beginning of the nineteenth century, but the defenses are now of little importance. The citadel, which stands on higher ground than the rest of the city, is a quadrilateral of 3600 feet to a side and is surrounded by a brick wall 12 feet high, and a deep moat. Within this inclosure are the palace, the royal pagoda, public offices and official residences, the treasury, court of justice, barracks, arsenals, magazines, etc. The old town lies between the citadel and the river. The principal trade is in silk and rice and is largely in the hands of the Chinese, and embroidery and pearl work form important industries. There are also a cotton-spinning mill, an ice factory, a match factory, a brewery, a paper factory, some furniture shops, and distilleries. The Songkoi is navigable at all seasons as far as Hanoi by vessels drawing 8 or 9 feet. Above that point the river is shallow, and there are many rapids, but flat-bottomed vessels drawing not more than 3½ feet can ascend quite a distance. Haiphong (q.v.) is the port of Hanoi, which is connected with it by rail as well as with Langson on the Chinese frontier. Several French periodicals and daily newspapers are published in Hanoi, and a new race course was opened there in 1890. The city is well supplied with drinking water from enormous water works. There are four lines of electric tramways, covering a distance of 8 miles. The railway from Haiphong to Hanoi was opened in 1902, and the Yunnan line was completed for the entire length in 1910. The transit trade is considerable. The population is estimated at about 110,000, of which 3000 are Europeans, exclusive of the military, and the rest Annamites, Chinese, Japanese, and Indians.

HANOTAUX, ȧ′nō̇′tō̇′, GABRIEL (1853–). A French historian and politician, born at Beaurevoir, Aisne. From being a specialist in paleography and modern history, he passed into the civil service (1879), as director of the historical department in the national archives, and became in 1881 subchief of Gambetta's cabinet and later chief of that of Jules Ferry. In 1885 he was counselor of Legation at Constantinople, and the following year he was elected deputy for Aisne. He served in the Chamber till 1887 and was mainly conspicuous for his opposition to Boulanger. He was appointed Director in the Ministry of Foreign Affairs in 1892, and in May, 1894, became Minister of Foreign Affairs in the Dupuy cabinet, remaining in office through several changes of premiership, till October, 1895. In the Méline ministry (1896–98) he again held the portfolio of Foreign Affairs. He was one of the most ardent supporters of the policy that ended in the famous Franco-Russian alliance. In 1897 he was elected to the Academy. Among his published works are: *Origines de l'institution des intendants des provinces* (1884); *Henri Martin* (1885); *Etudes historiques sur le XVIème et le XVIIème siècle en France* (1886); *Le recueil des instructions données aux ambassadeurs à Rome* (1888); *Histoire du cardinal de Richelieu* (1893–96); *La France et la royauté avant Richelieu* (1898); *La Seine et les quais, Promenades d'un bibliophile* (1901); *Du choix d'une carrière* (1902); *Souvenirs de Mme. Maintenon* (1902); *La jeunesse de Balzac* (1904); *Histoire de la France contemporaine* (1903–09); *La France vivante en Amérique du Nord* (1913). Consult Jeanroy-Félix, *Fauteuils contemporains* (Paris, 1905).

HANOTEAU, ȧ′nō̇′tō̇′, HECTOR (1823–90). A French landscape painter, born at Decize (Nièvre). At the Ecole des Beaux-Arts, he was a pupil of Gigoux, and devoted himself chiefly to landscapes, characterized by sturdy realism and skillful color. The best known are "The Village Pond," "The Frogs," and "The Water Lilies," all in the Luxembourg. He is represented also in several French provincial museums. He received a first-class medal at the Paris Exposition of 1889 and the cross of the Legion of Honor in 1870.

HAN′OVER. A town in Grey Co., Ontario, Canada, on the Saugeen River, and on the Grand Trunk and Canadian Pacific railways (Map: Ontario, D 5). It possesses a public library, and its industrial establishments include eight furniture factories, a brickyard, cement works, a woolen mill, a flour mill, and a shirt factory. Pop., 1911, 2342.

HAN′OVER, Ger. **HANNOVER**, hȧ-nō′vẽr. A former kingdom of Germany, constituting since 1866 the most northwestern province of Prussia (Map: Prussia, C 2). The North Sea and the Elbe River border the region on the north and northeast, the Prussian Province of Saxony and Brunswick on the east, the Prussian provinces of Hesse-Nassau and Westphalia on the south and southwest, and Holland lies on the west. Hanover is nearly cut in two by the Grand Duchy of Oldenburg. It embraces the old Brunswick-Lüneburg possessions, together with the principalities of Hildesheim, East Friesland, Göttingen, Osnabrück, etc. Area, 14,869 square miles.

Geographical Features. The general physical character of Hanover is that of an extended alluvial plain with slight undulations—the western continuation of the great low plain of northern Germany. In the south, however, the country is mountainous, embracing a considerable part of the western Harz (reaching a height of about 3350 feet), together with the lesser heights of the Eichsfeld and other mountain ranges. The mountains are covered with dense woods. The valleys between the mountains are fertile, with a good clayey loam, and well adapted to agriculture. Beyond the valleys, towards the north, the country is traversed from northwest to southeast by a sandy tract from 50 to 80 miles in width known as the Lüneberger Heide, which is almost wholly unfit for agricultural purposes. Towards the northwest from the mountain region extend elevated levels, characterized by heaths and other dry areas. Great marshes, peat moors, "floating fields," cover the northwestern and extreme northern districts of the province. These sections have in some parts been successfully drained and fertilized and furnish good pasture; but a large portion is still unreclaimed, and is regarded as one of the least productive parts of Germany. The morass of Bourtange, on the borders of Holland, alone covers 500 square miles. The coast, partaking of the nature of the Holland coast, is low and requires protection from the overflowing of the "German Friesland," the land being in many localities below the level of the sea. Along the banks of the rivers and adjoining the dike-protected coast are very fertile and highly cultivated districts. The principal rivers are the Elbe, which receives several affluents from the southwest; the Weser, on whose affluent, the Leine, is situated the capital, Hanover, and among whose other tributaries are the Aue, the Emmer, and the Aller; the Ems; and the Vechte—all falling into the North Sea. The meridional direction of the Leine has given it the traffic between the Northern lowland and Thuringia and South Germany, and the crossing of this line by the Cologne to Berlin road has made Hanover one of the large centres of the kingdom. There are only two considerable lakes, the Dümmersee and the Steinhuder Meer.

Climate and Mineral Resources. The climate is damp near the ocean, where fogs and heavy winds are frequent; in the south it is drier and colder, being bleak in the Harz in winter. In the vicinity of the moors fevers are prevalent, and the mortality is high. The mean annual temperature is about 47° F. The mining industry is important, and is carried on mostly in the Harz region. The chief minerals are coal and iron. In 1912 the mining district of Clausthal produced 207,880 metric tons of coal, 1,132,496 tons of brown coal or lignite, and 906,132 tons of iron ore. Zinc, lead, and copper are also mined, while salt products are prominent. Turf and peat are large and important outputs, being shipped up the streams and canals towards the interior for use as fuel. Some mineral oil is found, the production amounting to 87,443 metric tons in 1912.

Agriculture. About one-third of the total area of the province is under tillage—farm and garden—a little over one-fifth is under pasture and meadow, and nearly one-sixth under forest. According to the census of 1907 there were 370,505 land holdings, with a total area of 7,210,177 acres. Of these, 219,185 holdings covered less than 5 acres each; 67,013, from 5 to 12½ acres each; 64,586, from 12½ to 50 acres each; and 19,721, over 50 acres each. In the drier regions of the country rye is the prominent crop; in the marsh and moor districts, wheat, oats, barley, buckwheat, rape, and potatoes are grown. Cattle raising is an important industry. For wheat and oats Hanover is one of the leading regions in Germany. In the mountain valleys the farming is intensive, and fruit is the leading product. The sugar-beet industry is rapidly growing. Clover, flax, and tobacco are raised.

Manufactures and Commerce. The manufacturing industries are prosperous and growing, especially in the southern part of the province. The industrial census of 1907 gives the number of mining and industrial establishments as 60,545, employing 146,580 persons. Among the chief manufactured products are cotton and woolen textiles, machinery, wagons, leather, glassware, cigars and tobacco, paper, chemicals, and spirits. Shipbuilding is a prominent industry. There are several chambers of commerce that actively further the interests of manufacturing and agriculture. The commerce is extensive, the city of Hanover ranking among the leading commercial towns of Prussia. In 1907 there were 35,108 commercial establishments, employing 81,770 persons. Trade is greatly facilitated by the numerous splendid waterways of the province, as well as by its ample roads and railways, the last exceeding 2000 miles in length and belonging for the most part to the state. The Province of Hanover has about 40 ports, of which six are important shipping centres, including Harburg and Geestemünde. In 1913 the Hanoverian shipping trade owned 967 sea-going ships of all kinds, which had, however, a light tonnage—45,786 tons net.

Government and Instruction. For purposes of administration Hanover is divided into the six counties of Hanover, Hildesheim, Lüneburg, Stade, Osnabrück, and Aurich, which are divided into 79 circles. The province is represented by 36 members in the Prussian Chamber of Deputies and by 10 in the Upper House. It sends 19 members to the German Reichstag. In educational matters Hanover holds high rank. Education is free, compulsory, and thoroughly diffused. There were 3624 public grammar schools in 1911, with 8586 teachers and 470,465 pupils. In 1913 there were 103 secondary schools (Gymnasia and Realschulen), with 28,971 pupils, and other schools of advanced instruction. There is also the famous university at Göttingen (q.v.). Among the practical schools are the royal mining academy in Clausthal, the building school in Nienburg, and the forestry school in Münden. There are a technical high school (in the capital), five navigation schools, several agricultural institutions, a school for the cultivation of meadows, a veterinary high school, and several unions for the diffusion of practical knowledge, as well as various associations fostering the interests of science, art, history, natural philosophy, engineering, and architecture. There are two large libraries—that of Göttingen University, and the Royal Library in the capital. The Royal Theatre of Hanover holds a creditable rank in Germany.

Population. The population of the province was 2,278,361 in 1890; in 1900, 2,590,939; in 1905, 2,759,245; in 1910, 2,942,436, of whom 85.1 per cent were Protestants, and 13.8 per cent Catholics. There were 1183 emigrants in 1912, nearly all to the United States.

HISTORY

The early history of Hanover is that of Brunswick. In 1235 Otho, the grandson of Henry the Lion, of the famous house of Guelph (Welf), was recognized as Duke of Brunswick by the Emperor Frederick II. On the death of Ernest the Confessor, Duke of Lüneburg, in 1546, his dominions were divided between his sons, Henry, who became the founder of the Brunswick-Wolfenbüttel line, and William, who founded the new line of Brunswick-Lüneburg. (See BRUNSWICK, HOUSE OF.) Several divisions were made among the members of this family, the most important of which occurred in 1635, when George, the son of

William, received the principalities of Calenberg and Göttingen and took up his residence in the city of Hanover. Duke George died in 1641 and was succeeded by his son, Christian Louis, who in 1648 succeeded to the possession of Lüneburg, transferring Calenberg to his brother, George William. In 1665 George William in turn secured Lüneberg, and Calenberg fell to the possession of his younger brother, John Frederick, who was succeeded by still another brother, Ernest Augustus, in 1679. This Prince introduced the law of primogeniture into the succession of the principality in 1683 and in 1692 secured the electoral dignity for his house from the Emperor Leopold I, becoming Elector of Hanover. He married Sophia, the daughter of Elizabeth, wife of the Elector Palatine, Frederick V, and the granddaughter of James I of England, thus connecting the Hanoverian house with that of England and Scotland. Their son, George Louis, succeeded his father in the Duchy of Calenberg and in the electoral dignity in 1698, and, by marrying his cousin Sophia Dorothea he united the two duchies of Calenberg and Lüneberg on the death, in 1705, of George William. In 1714, on the death of Queen Anne, George Louis, Elector of Hanover, ascended the throne of Great Britain as George I (q.v.), being the nearest Protestant heir, through his mother, the Electress Sophia. Till 1831 Hanover and Great Britain had the same sovereign. With George a brighter epoch opened for the inhabitants of Hanover, who were relieved from the burden of maintaining the court and ducal household, while the revenues of the crown were thenceforth appropriated solely to the general purposes of the state. Indeed it was claimed that George I and George II favored Hanover at the expense of England. The secularized sees of Bremen and Verden were obtained in 1715 by purchase from Denmark. George II, who succeeded in 1727, participated in the War of the Austrian Succession as an ally of Austria and an opponent of Frederick the Great. In the Seven Years' War, however, during which Hanover suffered materially at the hands of the French, who were the allies of Austria, he sided with Prussia. This King founded the University of Göttingen in 1734. The first 30 years of the reign of George III (q.v.) of England, who succeeded to the Electorate of Hanover on the death of his grandfather in 1760, contributed largely towards the prosperity of the electorate. Like the other states of northern Germany, Hanover profited by the increased English and American trade, for which the Hanoverian ports and rivers formed the regular channels of communication with the rest of Germany. In 1793–95 Hanoverian troops took part in the wars against the French Republic, but the expense of their maintenance was defrayed by England. Prussia occupied Hanover in 1801, but withdrew after a few months. In 1803, when war was renewed between France and England, Napoleon threw an army, under the command of Mortier, into Hanover, and the result of this measure was to compel the Hanoverian government to enter into a convention by which it bound itself to abstain from taking part against France during the pending war, to give up fortresses and munitions, to subsidize French troops, and to participate unconditionally in the general costs of the war. In 1807 Napoleon, after having ceded Hanover to Prussia and again withdrawn it, appropriated a portion of the electorate to complete the newly formed Kingdom of Westphalia, which in 1810 received the whole of the Hanoverian territory. Later in 1810 a portion of Hanover was united with France and divided into the departments of Bouches de l'Elbe, Bouches du Weser, and Leine. After the expulsion of the French, Hanover was handed back to George III, Nov. 4, 1813. The Congress of Vienna raised Hanover to the rank of a kingdom and granted it important territorial additions in East Friesland.

In 1816 the Duke of Cambridge, brother of the Prince Regent of England, became Governor-General of Hanover; and in 1819 a new constitution was granted, providing for two representative chambers. The government remained largely autocratic, however, and the influence of Count Münster was paramount in Hanoverian affairs. Very little was done towards the improvement of the administration, and when William IV ascended the throne, in 1830, the general disaffection and distrust had risen to the highest pitch. The influence of the July revolution extended to Hanover, and in 1831 disturbances broke out at Osterode and Göttingen. These were speedily put down; but as the national discontent did not abate, Count Münster was dismissed, and the Duke of Cambridge, who had hitherto acted as Governor-General, was invested with the title of Viceroy and intrusted with very extensive powers. The Estates were convoked, and in September, 1833, a new organic instrument was promulgated. The death of William IV, in 1837, placed Hanover under the rule of the next male heir, Ernest Augustus, Duke of Cumberland, son of George III, as by Hanoverian law succession to the throne was denied to a woman. Chagrined by the loss of the crownland, one of the first measures of the new King was to abrogate the constitution of 1833 and to restore that of 1819. In consequence of their refusal to take the oath of allegiance required from all persons holding office under the state, seven of the professors at Göttingen, among them Dahlmann, Ewald, Gervinus, and the brothers Grimm, were expelled from the university. In 1840 a new and autocratic constitution was promulgated. From this period till 1848, when the success of the French Revolution compelled the German rulers to adopt a more liberal policy towards their subjects, the King showed himself resolutely averse to reform, though the Hanoverian people themselves were strongly in favor of the constitution of 1833. Only the danger of a revolution in 1848 forced the King to grant a constitution more liberal in nature than even that of 1833. The danger once over, however, he reverted to his former policy and dismissed his liberal ministry. A revolution was prevented by his death in 1851. Ernest Augustus was succeeded by his son, George V, who, though blind, was an active and energetic upholder of the royal power and chose a ministry that adhered to the aristocratic ideas. In 1854 Hanover joined the German Zollverein. In 1855 the constitution underwent various modifications in accordance with the demands of the federal Diet, by which it was made to approximate more closely to that granted by Ernest Augustus in 1840. Although the changes were unpopular, they met with no energetic opposition. In the war of 1866 Hanover threw in her lot with Austria, and in June the kingdom was occupied by Prussian troops, and on the 28th of that month the Hanoverian army was forced to capitulate. By the Peace of Prague the incorporation of Hanover with Prussia was recognized. Both George V, who died in 1878, and his son, Ernest Augustus, Duke of Cumberland (q.v.), refused to acknowledge the act of annexation and went into exile. On this account their private estates in Hanover were sequestrated by Prussia, the proceeds being denominated the Guelph Fund (q.v.). The Hanoverian deputies kept up a constant protest in the Reichstag against the annexation, but finally, in 1892, Ernest Augustus renounced any intention of intriguing against Prussia, and the income of the Guelph Fund was handed over to him. The bitterness between the Guelphs and the reigning house of Prussia, the Hohenzollerns, was practically dissolved by the marriage of the Kaiser's daughter, Victoria Louise, to Ernst Augustus, son of the Duke of Cumberland, in 1913. The Kaiser and the Bundesrat did not require a formal renunciation of the claims of the house of Cumberland to the Hanoverian throne when Ernst Augustus became Duke of Brunswick, and the reconciliation appears complete.

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HANOVER. The capital of the Prussian Province of Hanover (q.v.), formerly the capital of the Hanoverian kingdom, situated in a low, level region, on both sides of the Leine, which here becomes navigable, in lat. 52° 22′ N. and long. 9° 45′ E. (Map: Prussia, C 2). Its area is over 16 square miles. The mean annual temperature during the 50 years, 1851–1900, was 47.5° F.—January 32.9°, July 63.3°; average rainfall, 23.5 inches.

Hanover is composed of the Altstadt (old town), the Aegidien-Neustadt, the Calenberger-Neustadt (dating from the thirteenth century), inclosed by the Leine and its little tributary the Ihme, and a number of suburbs. The town of Linden lies beyond the Ihme. Numerous river bridges facilitate the communication between the various sections of the city. The environs abound with spacious parks and promenades which ennoble the city and justify its fame for dignified beauty. The Eilenriede—the city forest—adjoins the town on the east and contains the zoölogical gardens. The magnificent wide Lindenallee, about 1½ miles long, is celebrated, as well as the Grosse Garten, laid out by Le Nôtre and richly adorned with statues, etc. The Herrenhausen Castle, with its parks, its great fountain, and its rare collection of palms, is visited by all tourists, as is also the fine adjacent mausoleum containing monuments to Ernest Augustus and his Queen, by Rauch. In the oldest portion of Hanover are found many houses dating from the fifteenth and sixteenth centuries, with stucco façades. The newer parts of the city are generally modern in appearance, being handsomely built of stone and brick and profusely adorned with monuments, fountains, etc. Among the conspicuous recent edifices are the magnificent municipal buildings, such as the railway station and the new Rathaus. The most venerable church in Hanover is the fourteenth-century brick Marktkirche, situated in the centre of the old town. It has a tower 300 feet high and contains some fine stained glass and a carved altar. The Gothic Aegidienkirche, dating also from the fourteenth century, with a Renaissance tower, the modern Christuskirche with its fine stained glass, the Roman Catholic Marienkirche, and the old Nikolaikapelle are the other noteworthy ecclesiastical edifices. In the churchyard of the Gartenkirche lies buried Goethe's famous Lotte (Charlotte Kestner), whose family has long been identified with Hanover.

Among the secular buildings the most prominent are the Royal Palace, originally constructed in the seventeenth century and rebuilt in 1817, with its majestic colonnade, its fine chapel containing a beautiful altarpiece by Cranach, and interesting frescoes; two other royal palaces associated with the history of the reigning families of Hanover and England, one of them the old palace of George V, which was the favorite palace of George I and George II of England, and is now used as a town hall; the splendid old late-Gothic Rathaus, built in 1439–55 and recently restored, with a frescoed Ratskeller by Schaper, and a bronze Gothic fountain in front; the Royal Theatre, completed in 1853, with an attractive façade decorated with statues of famous dramatists and composers and, in the foreground, a statue of Marschner, formerly conductor of the Hanoverian Royal Orchestra; the provincial museum; the Kestner Museum; and the barracks, situated on the Waterlooplatz. This square is adorned by the Waterloo Column, surmounted by a figure of Victory, erected in 1826–32 in honor of the Hanoverians who fell at La Haye Sainte. Among the numerous monuments in the city are the fine bronze equestrian statues of King Ernest Augustus, by A. Wolff; the imposing war monument (one of the best in Germany), by Voltz, dating from 1884, with symbolic figures of Germania and Hanover; and Dopmeyers' famous artistic "Goose-Girl Fountain." Another object of interest is Leibnitz's house, recently restored by Haupt.

The city is a well-known educational centre, and a favorite place of residence for foreign families, who are attracted not only by the pleasant and quiet charm of the capital, but by the purity of the German spoken there. The educational establishments comprise a school of technology (one of the five in Prussia), having various interesting collections, and an attendance of 1796 in 1913; a veterinary high school (one of the two in Prussia), founded by George III of England in 1778; several seminaries for teachers; a decorative art high school; and a number of lyceums and military and industrial schools. The Royal Library contains over 200,000 volumes and 3500 manuscripts. The municipal library is also rich in manuscripts. The new provincial museum has among its various treasures an important collection of pre-Christian antiquities, two picture galleries of minor interest, including both ancient and modern canvases, and some statuary by Canova and Rauch. The Kestner Museum contains Egyptian and Roman antiquities, old manuscripts and incunabula, the famous Eulemann collection, paintings, miniatures, etc. The Royal Theatre, with seats for

1800, is one of the leading theatres of Germany of the second rank. There are two good private theatres. The city has a celebrated military riding school, and numerous scientific, historical, art, and art-industrial organizations, as well as important hospitals and charity homes.

The city, as the capital of the Province of Hanover, is the seat of the presidency and the higher courts. The administration of the city is in the hands of a director, a syndic, an executive board of 17 senators or magistrates, and a municipal council of 24 members. The city is lighted by electricity, has an electric street railway, good water works, and owns a market and a slaughterhouse. In the fiscal year ending March 31, 1913, the proceeds of direct and indirect taxes amounted to 11,577,000 marks. At the end of the year the municipal debt amounted to 77,530,000 marks, or $18,542,000.

The industrial importance of the city has been greatly increased in late years by reason of the improvement in its railway connections. It is now a railway and a manufacturing centre. Among the larger industrial establishments are an oilcloth factory, a railway repair shop, a number of machine shops, iron foundries, iron-bridge works, piano factories, and chemical works. There are also produced lacquer ware, oilcloths, books, lamps, liquors, and asphalt. Leather is an important output. The trade, which is of considerable magnitude, is actively promoted by a number of prominent commercial, agricultural, and manufacturing associations, banks, and other institutions of credit. The city is the seat of the leading industrial provincial organizations. The population of Hanover proper was 163,593 in 1890, 235,649 in 1900, and 302,375 in 1910. It is the twelfth city in size in Germany and the seventh in Prussia. In 1913, for the purposes of taxation, the population of the city was officially estimated at 312,919. Nearly all the population is Protestant.

History. Hanover originally was a little fishing town, and nothing is known of it worth recording until 1203, at which time Henry, the son of Henry the Lion, Duke of Saxony, received it with his share of lands left by his father. He soon handed it over to his nephew Otho, the founder of the house of Brunswick. From Duke Otho, Hanover received in 1241 a municipal charter, and soon after it joined the Hanseatic League, in which, however, it played only a minor rôle. Its importance rose after 1636, when it became the residence of one line of Brunswick dukes. (See HANOVER, Province.) In 1714, however, the Elector of Hanover became King of England, and until 1837 the city was a monotonous provincial town. Upon the death of William IV of England, Ernest Augustus, Duke of Cumberland, the new King of Hanover, took up his residence here. In 1866 the Kingdom of Hanover was annexed to Prussia, and since then the city has been the capital of the Prussian province of the same name. Hanover has grown rapidly in recent years and is more prosperous under Prussian rule than it ever was as the capital of an independent kingdom. Consult: Hoppe, *Geschichte der Stadt Hannover* (Hanover, 1845); Hartmann, *Geschichte der Residenzstadt Hannover* (Hildesheim, 1886); Hirschfeld, *Hannovers Grossindustrie und Grosshandel* (Leipzig, 1891).

HANOVER. A town in Grafton Co., N. H., 55 miles northwest of Concord, on the Connecticut River, opposite Norwich, Vt., with which it is connected by a bridge (Map: New Hampshire, E 5). It is the seat of Dartmouth College (q.v.) and has the Mary Hitchcock Memorial Hospital. There are minor manufactures, but the town is interested mainly in agriculture, dairying, and lumbering. Pop., 1900, 1884; 1910, 1340.

HANOVER. A borough in York Co., Pa., 19 miles southwest of York, and 54 miles north-northwest from Baltimore, Md., on the Pennsylvania and the Western Maryland railroads (Map: Pennsylvania, H 8). It is in a productive agricultural region which also has iron-ore deposits and is of considerable commercial and industrial importance, its manufactures including cigars, gloves, silks, flavine, water wheels, flour, shirts, shoes, machine-shop products, furniture, wire cloth, and ironstone grinders. The borough contains a public library, a fine high-school building, and two city parks. Settled about 1730, Hanover was incorporated in 1815. It is governed by a burgess, elected every four years, and a borough council. Here, on June 30, 1863, the Union forces under Kilpatrick met the Confederate forces under Stewart, and a skirmish ensued on the main streets. Pop., 1900, 5320; 1910, 7057.

HANOVER COLLEGE. An educational institution, situated at Hanover, Ind., chartered as an academy in 1825 and as a college in 1833. It is affiliated with the Presbyterian church and since 1880 has admitted women. The number of students was, in 1914, 224 in regular collegiate standing and 64 special students. At the same time the college had a library of 23,000 volumes, an endowment of $325,000, grounds and buildings valued at $175,000, and an annual income of $24,500. No tuition fee is charged. The college provides a general liberal-arts course leading to the A.B. degree. The president in 1914 was William A. Millis, LL.D.

HANOVER COURTHOUSE, BATTLE OF. An engagement fought at Hanover Courthouse, 17 miles north of Richmond, Va., on May 27, 1862, between a part of the Federal Army of the Potomac under Gen. Fitz John Porter and a Confederate brigade under General Branch, the latter, after offering a stubborn resistance, being driven from the field. The Federals lost 355 in killed, wounded, and missing; the Confederates 265, and about 730 prisoners, of whom 150 were also wounded. Consult *Battles and Leaders of the Civil War*, vol. ii (New York, 1887).

HANOVER SQUARE. A London square, laid out in 1731. Near it stands St. George's Church, the scene of the most fashionable London weddings.

HANRIOT, F. See HENRIOT, F.

HAN'SA, THE. See HANSEATIC LEAGUE.

HAN'SARD. A name well known in connection with the printing of the British parliamentary records. The first of the family was Luke Hansard (1752–1828), who was born in 1752 at Norwich and, coming to London, worked for some years as compositor in the office of Hughes, the printer to the House of Commons; in 1774 he and Hughes entered into a partnership, and in 1800 he succeeded Hughes as sole proprietor of the business, which until 1891 was still carried on by his family.

The name of Hansard is connected with an important question of parliamentary privilege. The case was briefly as follows: A bookseller named Stockdale brought an action for libel against the Hansards, the libel consisting of statements in the parliamentary reports which the latter had printed, and Lord Chief Justice Denman decided in favor of Stockdale. This decision seemed to violate the clause in the Bill of Rights that "debates and proceedings in Parliament ought not to be impeached or questioned in any court or place out of Parliament." A committee of the Commons reported that Parliament and each House had a right to authorize the publication of such matter as it believed to be for the public good, and further that to call this right in question was contrary to law and a breach of privilege of the House. The right to publish must necessarily carry with it the right to protect the publishers. So the struggle began, and, before it ended, the sheriff who served the decrees of the courts, the attorneys of Stockdale, as well as Stockdale himself, and many others, were imprisoned by the authority of the Commons. On the other hand, the property of the Hansards was seized under the decrees of the court. After three years of strife and debate Parliament ended the anomaly of a conflict between the two departments of government and also did away with the antiquated methods of parliamentary redress, by enacting a law that any proceedings against persons for publication of papers printed by order of either House of Parliament are to be stayed by the courts of law, upon delivery of a certificate and affidavit that such publication is by order of either House.

The Hansards are most widely known by the reports of the debates in Parliament, a branch of the business which was established by Thomas Curson Hansard (1776–1833), son of Luke Hansard, in 1803. The accuracy of these reports is rarely questioned. They were not, however, prepared by shorthand reporters employed by the Hansards, but were compiled from the reports in the London newspapers, and then submitted to the speakers for correction. The speeches as they appear in Hansard are not, therefore, in all cases the spoken words, but frequently are the product of the closet, the reviser inserting in many cases what he intended to say, or wished he had said, and omitting the heated passages, the utterance of which he regretted. Cobbett's—often called Hansard's—*Parliamentary History* (1066–1803) in 36 volumes furnishes the most complete available record of its proceedings during these centuries. From 1803 to 1891 the Hansards published the debates of Parliament in three series: (1) 1803–20, in 41 volumes; (2) 1820–30, in 25 volumes—an index of the whole forming an extra volume; (3) 1830–91, in 356 volumes. From 1891 to the present the debates —often still referred to as Hansard Debates— have been published by other houses. The fourth series comprises 199 volumes, and in 1914 there were of the fifth series 60 volumes of the House of Commons and 15 volumes of the House of Lords.

HANSARD. See HANSEATIC LEAGUE.

HANSEATIC CODE. See HANSE TOWNS, LAWS OF THE.

HAN'SEAT'IC LEAGUE, or **HAN'SA,** THE (from OHG. *hansa* [*hanse*], Goth. *hansa*, AS. *hōs*, league). A union established in the thirteenth century by some of the cities of northern Germany for their mutual safety and for the protection of their trade. This union grew out of associations of German merchants organized abroad. In order to travel and trade with greater security, these had long been accustomed to band themselves together into companies, and through such associations had secured privileges in certain cities, notably in London, Novgorod, Bergen in Norway, Bruges, and Visby in Gotland, off the coast of Sweden. In London the merchants of Cologne had obtained a letter of protection as early as 1157, and other German merchants who resorted to London joined the Cologne Hanse. When Lübeck, in the thirteenth century, began to threaten the supremacy of Cologne, the merchants of the latter city endeavored to exclude the men of Lübeck from trading in England. Possibly this opposition was influential in causing Lübeck to seek allies to strengthen its position. In 1241 she entered into a treaty with Hamburg for the mutual protection of the commercial highway between the two cities. This alliance, which is often regarded as the origin of the Hanseatic League, resulted in putting the control of commerce in the Baltic and the North seas into the hands of the merchants of Hamburg and Lübeck. In 1259 Lübeck, Rostock, and Wismar formed an alliance against pirates on the sea and robbers on land. In 1266 and 1267 the merchants of Hamburg and Lübeck were allowed to form separate hanses at Lynn, England. In 1285 the five Wendish cities of Lübeck, Wismar, Rostock, Stralsund, and Greifswald waged war against King Eric of Denmark and secured from him certain privileges. Before the end of the thirteenth century Cologne had been forced to take a subordinate position, and Lübeck was the recognized leader.

In the thirteenth century there were several instances of alliances formed between different groups of cities. These allied cities gradually found it advantageous to join the Lübeck union, which was constantly becoming more powerful. In 1343 it was officially designated as The Hansa. In 1362 the allies began a war against Waldemar IV of Denmark, who had attacked Visby in 1361; in 1367 the number of allied cities was so great that in 1370 Denmark was compelled to conclude a treaty with the "seventy-seven hansen," in which the latter were guaranteed freedom to trade and an indemnity for the losses which they had suffered. In addition it was agreed that no one in the future should receive the Danish crown without the advice of the cities and without the confirmation of the privileges of the Hanseatic League.

The entire league, which at one period embraced at least 85 towns, and included every city of importance between the Netherlands and Livonia, was divided at first into three, and later into four, classes, or circles: (1) the Wendic cities of the Baltic; (2) the towns of Westphalia, the Rhineland, and the Netherlands; (3) those of Saxony and Brandenburg; (4) those of Prussia and Livonia. The capitals of the respective circles were Lübeck, Cologne, Brunswick, and Danzig.

The professed object of the league was to protect the commerce of its members by land and by sea, to defend and extend its commercial relations with and among foreigners, to exclude as far as possible all other competitors in trade, and firmly to maintain, and, if possible, to extend, all the rights and immunities that had been granted by various rulers to the corporations. For the promotion of these ends, the league kept ships and armed men in its pay, the charge of whose maintenance was defrayed by a system of taxation and by the funds obtained from the money fines which the Diet levied for infringements of its laws. In its factory at Bergen in Norway only unmarried clerks and serving men were employed, and an almost monastic discipline was enforced; but the by-laws of the league prescribed a system of daily sports and light occupations for the recreation of the men, while judicious regulations for their comfort and cleanliness, and for the celebration of festivals at certain fixed times of the year, bear evidence of the sound sense that influenced the mode of government of the Hansa. This was further shown by the injunction to the masters of its factory to avoid everything that could hurt the prejudices of the foreigners among whom they were placed, and to conform in all things lawful to the habits of the country. At the Steelyard in London, where a German hanse was established as early as 1250, the regulations were similar in their severity to those of Bergen, and probably the customs at other factories were not far different.

For many years the Hanseatic League was the undisputed mistress of the Baltic Sea and the North Sea. It created new centres of trade and civilization in numerous parts of northern Europe and contributed to the expansion of agriculture and of the industrial arts by the construction of canals and roads. It carried on trade with every European country. The greatest powers dreaded its hostility and sought its alliance, and many of the powerful sovereigns of the Middle Ages were indebted to it for most substantial benefits.

The league reached its culminating point in the fifteenth century. Its decline was rapid. In proportion as the seas and roads were better protected by the states which now arose in Europe with the passing of the old feudal anarchy, and as rulers learned to comprehend the true commercial interests of their dominions, the power of the Hansa declined. The discovery of America and of the new sea route to India gave an entirely different direction to the trade of Europe. The herring fisheries, which had formed one great source of their wealth, were lost before the middle of the fifteenth century, as the herring deserted the Baltic for the coast of Holland. The Hansa had, moreover, arrogated to itself, in the course of time, the right of imposing the greater and lesser ban, and of exercising other acts of sovereignty which were incompatible with the supremacy of the rulers in whose states they were enforced. Hence the league was necessarily brought into frequent hostile collision with the local authorities. In accordance with their narrow commercial policy, the Hansards refused to grant to merchants trading in foreign parts the same privileges in the Hanseatic cities which they themselves had enjoyed for centuries in England, Russia, and Scandinavia, and hence arose dissensions, which not unfrequently ended in a fierce maritime warfare. By way of retaliation for the pertinacity with which the league refused to grant to the English the same immunities which had been accorded to traders of other nations, the English Parliament required that Germans should pay the tax on wool and wine which was exacted from all other foreigners in the English markets; this led to conflict and the Hanse cities would probably have lost all they possessed in England if their cause had not been advocated by Edward IV, who had more than once been indebted to them for money and aid, and who in 1474 secured for them, by a clause in the Treaty of Utrecht, a restitution of nearly all their former rights in England. By 1589 their obstinacy in insisting upon the maintenance of their old prerogatives, notwithstanding the altered condition of the times, drew upon them the anger of Queen Elizabeth, and there was general satisfaction when Drake and Norris seized upon ships of the Hansa, 61 of which were captured. In 1598 Elizabeth banished the Hansards from their factory in London. These measures had the desired effect of compelling the league to receive English traders on equal conditions, and thenceforward the Hansards were permitted to occupy the Steelyard, as before. The Hansa had, however, outlived its usefulness, and at the Diet held at Lübeck, in 1630, the majority of the cities formally renounced their alliance. Hamburg, Lübeck, Bremen, and for a short time Danzig, remained faithful to their ancient compact and continued to form an association of free republics, which existed unchanged until 1810, when the first three were incorporated in the French Empire. In 1815 they became members of the German Confederation. By a convention concluded in July, 1870, the powers and privileges of the three free towns were reëstablished and reorganized, and under the new German Empire they still retain their self-government and are still known as *Hansestädte.* Consult: Sartorius, *Geschichte des hanseatischen Bundes* (3 vols., Göttingen, 1802–08); Barthold, *Geschichte der deutschen Hansa* (3 vols., Leipzig, 1862); *Hansisches Urkundenbuch* (10 vols., Halle, 1876–1907); *Hansische Geschichtsblätter* (16 vols., Leipzig, 1872 et seq.); *Hansische Geschichtsquellen* (10 vols., Halle, 1875–1906); *Hansische Recesse* (23 vols., Leipzig, 1870–1910); Daenell, *Die Blütezeit der deutschen Hanse* (2 vols., Berlin, 1905–06); Lindner, *Die deutsche Hansa* (Leipzig, 1911); Helen Zimmern, *The Hansa Towns* (New York, 1889).

HÄNSEL UND GRETEL. An opera by Humperdinck (q.v.), first produced in Weimar, Dec. 23, 1893; in the United States, Oct. 8, 1895 (New York).

HANSEMANN, hän′ze-mân, DAVID JUSTUS LUDWIG (1794–1864). A German publicist and statesman, born at Finkenwerder, near Hamburg. He set up as a wool dealer at Aix-la-Chapelle in 1817 and, after having attained considerable reputation in commerce and through railway construction, was elected a deputy in the Provincial Diet of Rhenish Prussia in 1845. In 1847 he was elected a member of the United Diet, in which he became conspicuous as a leader of the Liberal Opposition, and in 1848 he was for a brief period Prussian Minister of Finance. He was the founder of the Diskontogesellschaft of Berlin, one of the most important financial institutions of Germany. His published works deal with economic and political topics of his time, and include *Preussens wichtigste Eisenbahnfrage* (1837) and *Das preussische und deutsche Verfassungswerk* (1850).

HANSEN, hän′zen, ADOLF (1851–). A German botanist, born and educated at Altona, Prussia. He became director of the botanical gardens of the University of Giessen. His best-known research was his minute study (in the eighties) of the yeasts used in brewing and his proof that the presence of many varieties of yeasts produced certain faults or diseases in the brew. He published: *Farbstoffe der Blüten* (1881); *Ernährung der Pflanzen* (1885); *Pflanzen-Physiologie* (1891); *Der Zellenbegriff*

(1897); *Die Entwickelung der Botanik seit Linné* (1902); *Haeckel und Herder* (1907); *Religion und Naturwissenschaft* (1908).

HANSEN, hän′sĕn, Emile Christian (1842–1909). A Danish botanist, born at Ribe, Jutland. Beginning life as a house painter, he later studied art and the natural sciences. In 1866 he obtained a scholarship at the University of Copenhagen and served as an instructor in the Gymnasium and later as head of the physiological laboratory at Carlsberg. He became an authority on plant physiology, especially on fungi and alcoholic fermenting yeasts. In 1887 he devised with Professor Kühle a new ferment now used in many European breweries. His publications include *Untersuchungen aus der Praxis der Gärungsindustrie* (2 vols., 3d ed., 1892–95) and *Gesammelte theoretische Abhandlungen über Gärungsorganismen*, edited by A. Klöcker (1911).

HANSEN, hän′sen, Gerhard Henrik Armauer (1841–1912). A Norwegian physician, born at Bergen. He is known chiefly as the discoverer of the bacillus of leprosy. He received his early education in the cathedral schools of his native city and on the completion of his medical studies became resident physician in the Rigshospital of Christiania. Later he spent some time as medical officer at the great Lofoten fisheries. In 1868 he was made assistant medical officer to the Bergen Leper Hospital, of which Danielssen was director. It was under the influence of this teacher that Hansen began his lifelong study of leprosy. Hansen's first investigation was to work out the significance of the "leper cells" of Virchow. After more study in various universities he returned to Norway to resume his investigations of leprosy. His researches pointed to the contagious and specific nature of the disease, and in recognition of the value of his work, the Medical Society of Christiania voted a sum of money to enable him to continue his studies. In his journeys about the country he came across instances of the disease which were explainable only by the theory of contagion. The conclusions at which he thus arrived conformed with those of Drognat-Landré, who had studied leprosy in Surinam, and who had published his views in 1869. Hansen's further labors were rewarded by the discovery of a bacillus in unstained preparations. Later the microörganism was stained and became known as Hansen's bacillus. This was in 1873. Subsequently Hansen for years tried to cultivate and inoculate the leprosy bacillus, but his efforts were unsuccessful. Nevertheless legislation called forth by Hansen's proof of the contagious nature of leprosy has effected a marked diminution of the disease throughout Norway and elsewhere. His distinguished work was recognized at the International Leper Congress held at Bergen in 1909.

HANSEN, Hans Christian Peter (1840–1905). A Danish critic, born at Copenhagen. Noted as a journalist and critic, he became editor of *Nær og Fjern* (1872–80), a high-class newspaper, afterward called *Illustreret Tidende*, which he also edited from 1880 to 1884. He made a Danish rendering of Goethe's *Faust* (1881–89), and his original publications include a romance, *Kristian Kjöbenhavner* (1882), an illustrated history of Danish literature, *Illustreret dansk Literaturhistorie* (1886; 2d ed., 1902), and *Illustreret dansk Teaterhistorie* (Copenhagen, 1896).

HANSEN, hän′sĕn, Mauritz Christopher (1794–1842). A Norwegian poet and novelist, born at Modum. He was a teacher, and prepared many textbooks, but is best known by his numerous novels. He was Norway's first Romanticist and shows the influence of Fouqué. His novels were the first accurately to describe the life and surroundings of the small towns of his own country and were very popular. They include *Luren*, *Den gale Christian*, *Bjergmanden*, and many others. After his death a collection of them was made by Schwach (8 vols., Christiania, 1855–58). A further selection, *Noveller i Udvalg*, was printed at Christiania in 1882. Hansen also wrote a volume of poems, *Digtninger* (1816).

HANSEN, hän′zen, Peter Andreas (1795–1874). A German astronomer, born at Tondern in Schleswig. He was employed by Schumacher, director of the Altona Observatory, to assist in the measurement of an arc of the meridian in Holstein. In 1825 he succeeded Encke as director of the observatory at Seeberg, near Gotha, where he remained for the rest of his life. He devoted his attention chiefly to the lunar theory, a revision of which he published under the title *Fundamenta nova investigationis orbitæ veræ quam luna perlustrat* (Gotha, 1838), and his *Tables de la Lune* (London, 1857) were so excellent that they were awarded a prize of £1000 by the British government and were published at its expense. The tables have been adopted for use in the calculations of the various astronomical ephemerides and nautical almanacs. Hansen was also the author of a large number of papers relating to the determination of the orbits of comets and planets. He was a foreign member of the Royal Society of London and was awarded the Copley medal of the society in 1850. He was also an associate of the Royal Astronomical Society, and in 1842 and 1860 received their gold medal for his research work in astronomy and his lunar tables. Hansen will rank for all time as one of the first mathematical astronomers of the nineteenth century.

HANSEN, hän′sen, Theophilus von (1813–91). A Danish architect, born in Copenhagen. He studied in the Copenhagen Academy and for further training traveled extensively in Italy and Greece. At Athens he practiced his profession to some extent, until the revolution of 1843 compelled him to withdraw to Vienna, where he was appointed superior councilor of architecture in 1869 and was for several years professor of architecture in the Academy of Fine Arts. He was an exponent of the classic Greek style and executed numerous works at Vienna, including the Greek Church, the restored façade of the Sina Palace, the Academy of Fine Arts, the Bourse, the Parliament House, and the Epstein Palace. Niemann and Feldegg published *Theophilus Hansen und seine Werke* in an edition de luxe at Vienna in 1893.

HANSE (hăns) **TOWNS**, Laws of the; also known as the Hanseatic Code. A code of maritime law, ordained for the regulation of commerce by the towns comprised in the Hanseatic League. It was established about the end of the sixteenth century and enjoyed great authority throughout northern Europe, until superseded nearly a century later by the *Guidon de la Mer* and the *Ordonnance de la Marine* of Louis XIV (qq.v.). It was first published in German in 1597 and in 1614 was revised and enlarged by a congress of delegates from the several towns of the league, which was held at Lübeck. It has been translated into Latin (by Kuricke) and into French (by Cleirac, in *Us et Coutumes de la Mer*, Paris, 1647). See ADMIRALTY LAW; and consult: Justice, *A General Treatise of the Dominion and Laws of the Sea* (London, 1705); Reddie, *Researches Historical and Critical in Maritime International Law* (Edinburgh, 1844); Pardessus, *Collection des lois maritimes antérieurs au XVIIIème siècle* (Paris, 1829–45).

HAN'SHEW, THOMAS W. (1857–1914). An American actor and writer, born in Brooklyn, N. Y. He went on the stage when only 16 years old, playing minor parts with Ellen Terry's company. Subsequently he played important rôles with Clara Morris and Adelaide Neilson. Later he was associated with a publishing house in London, where he resided at the close of his life. He used, among others, the pen name "Charlotte May Kingsley," and wrote in all more than 150 novels. At the time of his death it was reported in leading periodicals that he was the author of the stories written under the pseudonym "Bertha M. Clay." As a matter of fact, the earlier series of these stories was written by Mrs. Charlotte M. Braeme, of England, and after her death other authors took up the work, but Hanshew was not one of them.

HANSLICK, häns'lĭk, EDUARD (1825–1904). An Austrian musical critic and author. He was born at Prague and prepared himself for the bar, studying law at Prague and Vienna. In 1849 he received his degree of LL.D. and entered the government service; but the attraction which music had for him gradually drew him into the career he subsequently followed. His studies under Tomaschek at Prague, and later his experiences as musical critic of the *Wiener Zeitung* (1848–49), increased his interest in music. His most prominent characteristic was an uncompromising antagonism to exaggerated and foolishly sentimental criticism in music, and his celebrated work, *Vom Musikalisch-Schönen: ein Beitrag zur Revision der Aesthetik der Tonkunst* (1854; 10th ed., 1902), is particularly severe. He was one of Wagner's most bitter opponents, and one of the last of the critics to recognize the possibilities in the new style of opera. On the other hand, he was among the very first to recognize the towering greatness of Brahms. He was for many years musical editor of the Vienna *Neue Freie Presse*, and in 1861 became professor in Vienna University in the department of musical history and æsthetics. Those of his criticisms that are of more than passing value he republished in several volumes. Among these are: *Geschichte des Konzertwesens in Wien* (1869–70); *Die moderne Oper* (1875–1900); *Konzerte, Komponisten und Virtuosen der letzten fünfzehn Jahre* (1896); *Am Ende des Jahrhunderts* (1899). His autobiography, *Aus meinen Leben*, appeared in 1894.

HAN'SOM, JOSEPH ALOYSIUS (1803–82). An English architect and inventor. He was born at York and began to practice his profession as an architect at Halifax in 1825. He designed and built the Birmingham Town Hall, which he completed in 1833; but he became bankrupt under the terms of his suretyship for the builders. In 1831 Hansom patented a safety cab; but the modern vehicle which bears his name differs materially from the original one. In 1834 Hansom founded the *Builder*, but was forced by lack of funds to discontinue its publication. After 1842 he gave all of his time to architecture, ecclesiastical and domestic, chiefly for the Roman Catholic church, to which he belonged. Among the best known of the buildings designed and erected by him are St. Walburge's Church, Preston, Lancashire; the cathedral at Plymouth; the church of Our Lady and St. Philip Neri at Arundel; the Jesuit church at Manchester; the church of St. François de Sales, near Boulogne; and St. Asaph College.

HANSOM CAB. A light two-wheeled, one-horse, covered carriage, with the driver's seat elevated behind. The prototype of the modern hansom was named for its inventor, Joseph Aloysius Hansom (q.v.). See CARRIAGE.

HAN'SON, ALEXANDER CONTEE (1786–1819). An American editor and politician, born in Maryland, and educated at St. John's College, Annapolis. As editor of the *Federal Republican*, of Baltimore, he published an article in 1812 attacking the Madison administration with such bitterness that a mob, by way of reprisal, wrecked his office. A subsequent attempt to continue publication led to renewed violence, and he and a number of friends and supporters were removed to the local jail for safety. The populace, however, made its way into the jail, wounded Hanson and others, and killed General Lingan. Hanson then removed his office to Georgetown, D. C., where he continued the publication of his paper. Hanson was a Federalist member of the national House of Representatives in the Thirteenth and Fourteenth congresses, serving until November, 1816. Elected to the Senate, he served from January, 1817, until his death.

HANSON, LEVETT (1754–1814). An English author, born in Malton, Yorkshire. He was a lifelong friend of Admiral Nelson, with whom he went to school at Walsham, Norfolk. Hanson studied at Cambridge, but went abroad when 22 years old and spent the remainder of his life there, with but occasional visits to England. He was the recipient of many foreign orders and honors, while his experience in European courts gave him opportunity to collect material for his book, *An Accurate Historical Account of all the Orders of Knighthood at Present Existing in Europe* (1803). This was dedicated to Nelson, and his *Miscellaneous Compositions in Verse* (1811) to another friend, Warren Hastings.

HANSTEEN, hån-stān', CHRISTOPHER (1784–1873). A Norwegian astronomer, born at Christiania. At first intended for the legal profession, he subsequently devoted himself entirely to the study of mathematical science. In 1814 he was appointed to the chair of mathematics in the University of Christiania and there, in 1819, published his celebrated work on magnetism, which was afterward translated into German under the title *Untersuchungen über den Magnetismus der Erde* and produced a great sensation, especially in England. He made an extensive journey to Siberia, for the purpose of making magnetic observations, in the years 1828 to 1830, and returned to Europe with a large collection of facts, which were of much service in aiding to dispel the obscurity which enveloped this subject. On his return to Christiania he prevailed upon the government to erect an observatory, fitted also for magnetic observations. Besides occupying his chair in the university, Hansteen was professor of mathematics in the school of artillery, superintended the triangulation of Norway, and helped in the reorganization of the national system of weights and measures. He published lectures on astronomy, a work on mechanics, another on geometry, several scientific memoirs, and was one of the editors of the *Magazin for Naturvidenskaberne.*

HANSTEIN, hän′stīn, Johannes von (1822–80). A German botanist, born at Potsdam. He studied horticulture in Potsdam and Berlin, where he received the degree of Ph.D. in 1848. He was made a lecturer in the University of Berlin in 1855. In 1861 he was appointed custodian of the Royal Herbarium, Berlin, and from 1865 was professor of botany and director of the botanical garden at the University of Bonn. His botanical studies were varied, but have to do chiefly with plant anatomy and morphology. His publications include: *Untersuchungen über den Bau und die Entwicklung der Baumrinde* (1853); *Versuche über die Leitung des Saftes durch die Rinde* (1860); *Uebersicht des natürlichen Pflanzensystems* (1867); *Einige Züge aus der Biologie des Protoplasmus* (1880).

HANS VON BÜHEL. See Büheler, Hans der.

HANSWURST, häns′vụrst′ (Ger., Hans Sausage). The conventional buffoon in old German comedy. The name first appears in 1519 and is used by Luther in his *Wider Hanns Worst* in 1541 and as the name of a peasant in a play of 1553, but first occurs in 1573 as the title of a character in comedy.

HANTS, hănts. A colloquial name for the English County of Hampshire (q.v.).

HANUMĀN, hä′nōō-män, or **HANŪMĀN.** A famous monkey chief in Hindu mythology and the legends of the epic period of India and still a favorite divinity in Hindustan. He is represented in the Sanskrit epic *Rāmāyana* (q.v.) as the special ally and friend of Rāma and as leading the monkey hosts that helped this hero to recover his wife Sītā, who had been carried off by the demon Rāvana. The exploits of Hanumān play an important part in the account of this expedition and the great war which followed. On one occasion Hanumān bridged over the passage between India and Ceylon with enormous rocks, which he and his monkey followers threw into the sea. Adam's Bridge in the straits between the island and the mainland is still pointed out, according to tradition, as the remains of those bowlders. Many other stories and curious legends regarding him are told in the *Rāmāyana.* His birth was semidivine. His mother was a celestial nymph that had been cursed to assume a simian shape; his father was the god of the wind. Hence Hanumān is sometimes called Māruti, a child of the wind. His large face or monkey jaw is likewise accounted for in a legendary manner. The god Indra, angered at his youthful prowess, tried to slay him by the thunderbolt, but was able only to fell him and break his jaw. From this circumstance he received the name Hanumān, 'he of the (broken) jaw.' The monkey features, or masklike face of this deified ape, whose idols are easily recognized by the prodigious tail, are familiar enough in India, and episodes taken from his history are found represented in sculpture or in painting almost everywhere in Hindustan. According to the *Rāmāyana,* he was an astute grammarian and skilled in many branches of learning. His prowess is also recounted in the *Mahābhārata,* and a Sanskrit drama, the *Hanumān-nāṭaka,* "The Play of Hanumān," celebrates his deeds in 14 acts. It is not unlikely that underneath the curious and uncouth figure of Hanumān and his monkey hosts we may recognize some representatives of the earlier and ruder civilization of Lower India that may have joined forces with the invading Aryan civilization. The reverential regard paid to monkeys around the Hindu temples may, in a way, be associated also with Hanumān. Consult: Dowson, *Hindu Mythology* (London, 1879); Wilson, *Hindu Mythology* (ib., 1900); Macdonell, *History of Sanskrit Literature* (ib., 1913); Noble and Coomaraswamy, *Myths of the Hindus and Buddhists* (New York, 1914). See Dravidians; Rāmāyana. For illustration, see Plate of Hindu Deities in the article India.

HANUNU. See the first article Hanno.

HANUS, hä′nụs, Paul Henry (1855–). An American educator, born at Hermsdorf unter'm Kynast, Silesia, Prussia. He was educated at the Wisconsin State Normal School (Platteville) and the University of Michigan. In 1891 he became assistant professor, and in 1901 full professor, of the history and art of teaching at Harvard University. In 1911 he was appointed by a committee of the New York City Board of Estimate and Apportionment to take charge of a survey of the educational condition of New York City. The commission, which he headed, made a voluminous report in 1913. He was chairman of the Massachusetts State Commission on Education in 1906–09 and a member of the State Board of Education from 1909 to 1914. In 1909–10 he was president of the National Society of College Teachers of Education. His publications include: *Elements of Determinants* (1886); *Geometry in the Grammar School* (1894); *Educational Aims and Educational Values* (1899); *A Modern School* (1904); *Beginnings in Industrial Education and Other Educational Discussions* (1908); *School Efficiency* (1913).

HAN′WAY, Jonas (1712–86). An English traveler and philanthropist, born at Portsmouth. On the death of his father the family moved to London, and in 1719 Hanway was apprenticed to a merchant in Lisbon. In 1743 he became interested in trade with the East and journeyed through Persia, experiencing many hardships. After his return from Persia he spent five years in St. Petersburg, at the end of which period he received a large bequest which enabled him to retire from business. He returned to London in 1750, where, excepting for two trips abroad, he spent the remainder of his life, devoting himself to philanthropy and literature. In 1756 he was one of the founders of the Marine Society, organized to train seamen for the navy, and two years later became a governor of the Foundling Hospital, where he was active as an opponent of indiscriminate relief. In 1758 he helped to found Magdalen Hospital for Fallen Women. Hanway was almost constantly employed in the promotion of important reforms, such as the protection of the infant parish poor and of child chimney sweeps, the solitary confinement of prisoners, and the establishment of Sunday schools. He was, however. a man of many harmless eccentricities, of which his antipathy to tea drinking was one of the most amusing, and his attack on the habit had the unique honor of drawing a reply from Samuel Johnson. It is said that he introduced the use of the umbrella in London, after 30 years of ridicule. As a writer, Hanway was most prolific. Seventy-four books and pamphlets by him are enumerated, of which only one, his *Historical Account of the British Trade over the Caspian Sea* (4 vols., 1753), which contains an account of his travels, is of any lasting value. The most of his writings were occasional in character and were concerned largely with the reform movements in which he was interested. He also wrote several theological works, and *Common Sense: Nine Dialogues on the American War* (1775). As a reward for his public services, Hanway was appointed one of the commissioners for victualing the navy in 1762—an office which he held until obliged to resign, on account of ill health, in 1783. Consult Pugh, *Remarkable Occurrences in the Life of Jonas Hanway* (London, 1787).

HAN′WELL. A town in Middlesex, England, 10 miles west of St. Paul's, London. It is the seat of the Middlesex County Lunatic Asylum. (Map: London, E 4.) It has a progressive municipality, owns a sewage farm and recreation grounds, and maintains an isolation hospital. It is mainly a residential district. Pop., 1901, 10,400; 1911, 19,129.

HANYANG. See Seoul.

HANYANG, hän′yäng′. A departmental city of China, situated on the left bank of the Yang-tse, at the point where it receives the waters of the river Han, which separates it from Hankow. Its most conspicuous feature is Ta-pieh Shan, a precipitous hill crowned with ruined fortifications, from which a fine view of the surrounding country can be obtained. Commanding as it does both the Han and the Yang-tse, it early became an important military post, and the possession of Ta-pieh Shan was always an object of much interest to the contending parties in the numerous revolutions, rebellions, and wars which have characterized Chinese history from the earliest times. It received its present name in the sixth century, and, while it continued to be a strong military post, its advantageous position for trade soon attracted attention, and it became a very populous and flourishing city. Notwithstanding its proximity to Hankow, this state of things continued until the Taiping Rebellion (1852–64), when it was almost entirely wiped out. Hanyang never recovered until Chang Chĭ-tung, Governor-General of Hukwang, selected it in 1889 for the site of the arsenal and the great steel and iron works, cotton-spinning factories, etc., which he has established there. The ironworks (begun in 1891) cover a large area and include a number of large hot-air blast furnaces, and steam hammers, innumerable rollers, and all the necessary machinery for producing everything required for the Hankow-Peking Railway, which he planned. The sheds cover 20 acres. The coke used is obtained from Wales, but the ore needed in the manufacture of the rails is mined near Wangshiking, 76 miles below Hankow. Both hard and soft coal are mined in the same neighborhood. The plant in Hanyang also includes a railway 1½ miles long, from the Yang-tse to the works, and thence to the Han, with an inclined plane on the Yang-tse bank, 300 feet high, up which the cars are hauled by powerful machinery. The whole is under foreign management. Pop., about 100,000.

HAN-YÜ, hän-yụ′, better known as **HAN WEN-KUNG,** hän wŭn-ko͞ong′ (768–823). A Chinese poet, essayist, and philosopher. He was born at Tengchow in Honan in 768, became a diligent student of the classics, graduated with honors at 24, and shortly thereafter entered the public service. In 819, while Vice President of the Criminal Board, he incurred the displeasure of the Emperor, a great patron of Buddhism, by addressing to him a strongly worded remonstrance against certain public honors with which an alleged relic of Buddha was being conveyed to the palace. Through the intervention of friends he escaped with his head, but was dismissed from the court and banished to a semibarbarous region in the Province of Kwangtung. There he served for eight months as Governor, civilizing the inhabitants and conferring upon them many benefits. Afterward he was recalled to the capital, restored to high office at court, and loaded with honors, dying at 55, in 823. He was canonized as *Wen-kung* (Prince of Letters), was ennobled as Earl of Changli, and in 1084 his tablet was placed in the temple of Confucius. His name is venerated as that of the foremost scholar in China.

HAPARANDA, hä′pȧ-rän′dȧ. The most northerly town of Sweden, situated near the mouth of the Torneå on the Russian border, near the north shore of the Gulf of Bothnia (Map: Sweden, G 4). It is noted chiefly for its meteorological station, established in 1859. Its port is Salmis, 7 miles distant. Pop., 1901, 1334; 1911, 1442.

HAPAXANTHIC, hā′păks-ăn′thĭc, **HAPAXANTHOUS** (from Gk. ἅπαξ, *hapax*, once + ἄνθος, *anthos*, flower). A botanical term applied to plants that blossom and fruit only once in their life cycle. They are also characterized by the almost complete absence of vegetative reproduction. The term and its synonym, "monocarpic," are in contrast to "pleiocyclic." All annuals, most biennials, and a few perennials are hapaxanthic plants.

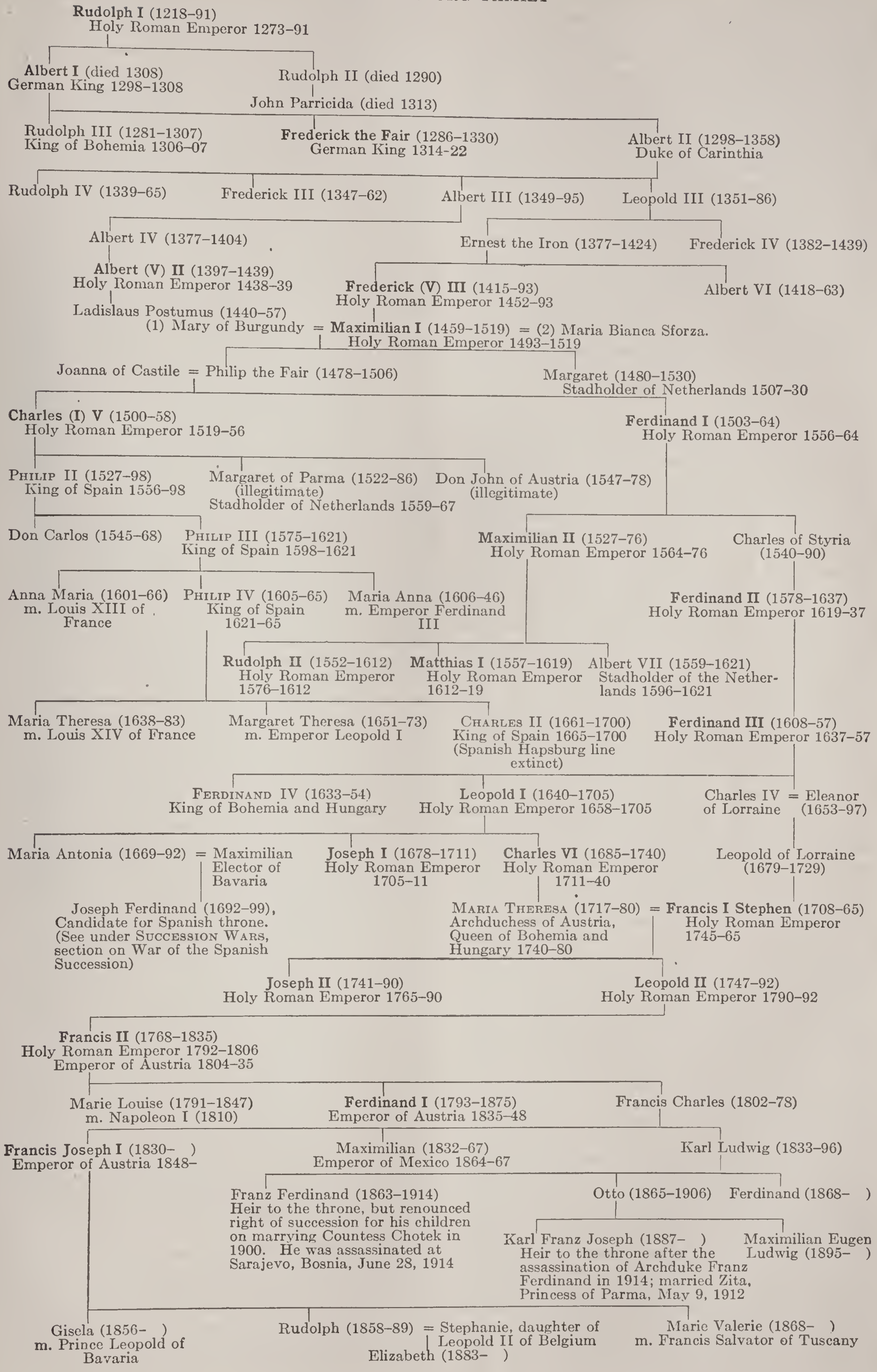
HAP′GOOD, Norman (1868–). An American editor and critic, born in Chicago, Ill. He graduated at Harvard in 1890 and at the law school there in 1893. He was dramatic critic of the New York *Commercial Advertiser* and of the *Bookman* in 1897–1902 and became editor of *Collier's Weekly* in 1903 and of *Harper's Weekly* in June, 1913. His editorial writing attracted much attention by its vigor and range. His publications include: *Literary Statesmen* (1897); *Daniel Webster* (1899); *Abraham Lincoln* (1899, 1913); *The Stage in America* (1901); *George Washington* (1901); *Industry and Progress* (1911).

HAPHTARAH, hăf-tä′rȧ (pl. *haphtaroth*, Heb., sections, from *pātar*, to split). The 54 sections from the prophets used in the synagogues on Sabbaths, in connection with the same number of sections into which the law is divided, called *parshioth*.

HAPLO′MI (Neo-Lat. nom. pl., from Gk. ἁπλόος, *haploos*, single + ὦμος, *ōmos*, shoulder). An order of soft-rayed, pikelike fishes, characterized chiefly by the absence of the mesocoracoid bone. They are mostly inhabitants of fresh waters and include the mud minnows (Umbridæ), the pikes (Luciidæ), the great group of top minnows, killifishes, and other "cyprinodonts" (Pœciliidæ), and the blindfish (Amblyopsidæ).

HAPPINESS, Seven Gods of. See Seven Gods of Happiness.

THE HAPSBURG FAMILY


Rudolph I (1218–91) Holy Roman Emperor 1273–91
Albert I (died 1308) German King 1298–1308
Rudolph II (died 1290)
John Parricida (died 1313)
Rudolph III (1281–1307) King of Bohemia 1306–07
Frederick the Fair (1286–1330) German King 1314-22
Albert II (1298–1358) Duke of Carinthia
Rudolph IV (1339–65)
Frederick III (1347–62)
Albert III (1349–95)
Leopold III (1351–86)
Albert IV (1377–1404)
Ernest the Iron (1377–1424)
Frederick IV (1382–1439)
Albert (V) II (1397–1439) Holy Roman Emperor 1438–39
Ladislaus Postumus (1440–57)
Frederick (V) III (1415–93) Holy Roman Emperor 1452–93
Albert VI (1418–63)
(1) Mary of Burgundy = **Maximilian I** (1459–1519) = (2) Maria Bianca Sforza.
Holy Roman Emperor 1493–1519
Joanna of Castile = Philip the Fair (1478–1506)
Margaret (1480–1530) Stadholder of Netherlands 1507–30
Charles (I) V (1500–58) Holy Roman Emperor 1519–56
Ferdinand I (1503–64) Holy Roman Emperor 1556–64
Philip II (1527–98) King of Spain 1556–98
Margaret of Parma (1522–86) (illegitimate) Stadholder of Netherlands 1559–67
Don John of Austria (1547–78) (illegitimate)
Don Carlos (1545–68)
Philip III (1575–1621) King of Spain 1598–1621
Maximilian II (1527–76) Holy Roman Emperor 1564–76
Charles of Styria (1540–90)
Anna Maria (1601–66) m. Louis XIII of France
Philip IV (1605–65) King of Spain 1621–65
Maria Anna (1606–46) m. Emperor Ferdinand III
Ferdinand II (1578–1637) Holy Roman Emperor 1619–37
Rudolph II (1552–1612) Holy Roman Emperor 1576–1612
Matthias I (1557–1619) Holy Roman Emperor 1612–19
Albert VII (1559–1621) Stadholder of the Netherlands 1596–1621
Maria Theresa (1638–83) m. Louis XIV of France
Margaret Theresa (1651–73) m. Emperor Leopold I
Charles II (1661–1700) King of Spain 1665–1700 (Spanish Hapsburg line extinct)
Ferdinand III (1608–57) Holy Roman Emperor 1637–57
Ferdinand IV (1633–54) King of Bohemia and Hungary
Leopold I (1640–1705) Holy Roman Emperor 1658–1705
Charles IV of Lorraine = Eleanor (1653–97)
Maria Antonia (1669–92) = Maximilian Elector of Bavaria
Joseph I (1678–1711) Holy Roman Emperor 1705–11
Charles VI (1685–1740) Holy Roman Emperor 1711–40
Leopold of Lorraine (1679–1729)
Joseph Ferdinand (1692–99), Candidate for Spanish throne. (See under Succession Wars, section on War of the Spanish Succession)
Maria Theresa (1717–80) Archduchess of Austria, Queen of Bohemia and Hungary 1740–80 = **Francis I Stephen** (1708–65) Holy Roman Emperor 1745–65
Joseph II (1741–90) Holy Roman Emperor 1765–90
Leopold II (1747–92) Holy Roman Emperor 1790–92
Francis II (1768–1835) Holy Roman Emperor 1792–1806 Emperor of Austria 1804–35
Marie Louise (1791–1847) m. Napoleon I (1810)
Ferdinand I (1793–1875) Emperor of Austria 1835–48
Francis Charles (1802–78)
Francis Joseph I (1830–) Emperor of Austria 1848–
Maximilian (1832–67) Emperor of Mexico 1864–67
Karl Ludwig (1833–96)
Franz Ferdinand (1863–1914) Heir to the throne, but renounced right of succession for his children on marrying Countess Chotek in 1900. He was assassinated at Sarajevo, Bosnia, June 28, 1914
Otto (1865–1906)
Ferdinand (1868–)
Karl Franz Joseph (1887–) Heir to the throne after the assassination of Archduke Franz Ferdinand in 1914; married Zita, Princess of Parma, May 9, 1912
Maximilian Eugen Ludwig (1895–)
Gisela (1856–) m. Prince Leopold of Bavaria
Rudolph (1858–89) = Stephanie, daughter of Leopold II of Belgium
Elizabeth (1883–)
Marie Valerie (1868–) m. Francis Salvator of Tuscany

HAPSBURG, or **HABSBURG,** häps′bṳrk, House of. The Imperial royal house of Austria-Hungary. It is commonly supposed to have derived its name from the castle of Habsburg, or Habichtsburg (Hawk's Castle), on the bank of the Aar, in the Swiss Canton of Aargau. The castle is said to have been built about 1027 by Werner, Bishop of Strassburg. His nephew, Werner I, was the first Count of Hapsburg; but the real founder of the house of Hapsburg was Albrecht (or Albert) III (c.1172), the son of Werner II, who, in addition to extensive estates which he had inherited in Upper Alsace, acquired several Swiss districts (in the neighborhood of Zurich, the Lake of Lucerne, etc.). To these his son, Rudolph I, added the Countship of Aargau. On Rudolph's death, in 1232, his sons, Albert IV the Wise and Rudolph II, divided their father's possessions—Rudolph becoming the founder of the Hapsburg-Lauffenburg line. This branch became extinct in 1415, its possessions, except the Klettgau, reverting to the Austrian line.

The son and successor of Albert IV, Rudolph III, was elected to the Imperial throne of Germany in 1273 (as Emperor, styled Rudolph I), and founded the greatness of the house of Hapsburg. In 1278 he vanquished Ottokar II of Bohemia and forced him to give up the duchies of Austria and Styria with other territories. In 1282 he invested his sons Albert and Rudolph with the territories which he had thus acquired. Albert I purchased his brother's share in 1283, and on the death of his father, in 1291, succeeded to that Prince's possessions, which included large districts in Switzerland. (See Austria-Hungary.) He was raised to the Imperial throne of Germany in 1298 and was murdered in 1308 by his nephew, John the Parricide, while preparing to subdue the Swiss, who had risen in defense of their liberties. Of his six sons, Rudolph was King of Bohemia (1306–07), and Frederick I was one of the rival kings of Germany (as Frederick III) from 1314 to 1322 (died 1330). For the succeeding hundred years the Imperial office was held by other families, and the Hapsburgs were occupied mainly in ruling their hereditary possessions. It was a family principle that the lands were indivisible and that the brothers should rule jointly. This principle was neglected at times, but the deaths of holders of territories which had been separated from the main possessions brought all Hapsburg lands under a single rule in 1457 and again in 1490. During this early period there were relatively few children, and many of the princes died without leaving heirs. This is in striking contrast with the later Hapsburgs, who were remarkably prolific, families of 13 to 15 children being common.

From 1438 until the abdication of Francis II in 1806, all but two of the Emperors of the Holy Roman Empire (Charles VII and Francis I) were Hapsburgs. The house attained its greatest power through the marriage alliances in the last quarter of the fifteenth century. In 1477 Maximilian, who became Emperor in 1493 (Maximilian I), married Mary of Burgundy, daughter of Charles the Bold, and thus obtained all the Burgundian possessions, which included the Netherlands, at that time the most opulent country in Europe. His son, Philip, who died in 1506, married Joanna, heiress of Spain, daughter of Ferdinand and Isabella. Their eldest son, Charles I (Charles V of the Empire), received as his share of the family possession Naples, Sicily, and Sardinia, while the Austrian possessions (Austria, Styria, Carinthia, Carniola, Tirol, Alsace, Breisgau, etc.) were left to him and his brother Ferdinand jointly. His share in these last Charles relinquished to Ferdinand. In 1535 Charles added the Duchy of Milan to his possessions. Charles was the founder of the Spanish line of Hapsburgs. Ferdinand was elected in 1526 to the throne of Bohemia (the Bohemian kingdom at this time including Moravia, Silesia, and Lusatia), which soon became practically hereditary in the Hapsburg line. At the same time he was elected King in a part of Hungary, the crown of which country, after the expulsion of the Turks, was by violence made hereditary in the Austrian dynasty (1687). The union of so many different countries in the hands of one family threatened the security of the other European countries, and especially of France, which was shut in by the possessions of Charles V. The rivalry which resulted continued until the end of the eighteenth century and brought upon Europe many wars. (See Europe.) In the sixteenth and seventeenth centuries the struggles between France and the Hapsburgs were involved with the religious wars. In the second half of the sixteenth century the power of the Spanish branch of the Hapsburgs received a severe blow in the revolt of the Netherlands, the northern provinces of which finally achieved their independence. By the middle of the seventeenth century the Hapsburg power was declining steadily. The Spanish branch, which after Charles I (Charles V) had been represented by Philip II, III, and IV, and Charles II, became extinct in 1700. The Austrian Hapsburgs became extinct in the male line by the death of Charles VI in 1740. By the Pragmatic Sanction (q.v.), however, his daughter, Maria Theresa, succeeded to the throne. She was married to Francis I of the house of Lorraine, and their descendants have continued to rule in Austria until the present day. One of Maria Theresa's 15 children was Marie Antoinette, the wife of Louis XVI of France; a great-granddaughter, Maria Louisa, was the wife of Napoleon I; another great-granddaughter was the wife of Pedro I of Brazil; and a great-grandson was Maximilian I of Mexico.

Consult: Lichnowsky, *Geschichte des Hauses Habsburg* (8 vols., Vienna, 1836–44); Coxe, *History of the House of Austria* (4 vols., London, 1864–72); Schulte, *Geschichte der Habsburger in den ersten drei Jahrhunderten* (Innsbruck, 1887); Weihrich, *Stammtafel zur Geschichte des Hauses Habsburg* (Prague, 1892); Hoernes, *Oesterreich-Ungarn und das Haus Habsburg* (Teschen, 1892); Gilbart-Smith, *The Cradle of the Hapsburgs* (London, 1907); Colquhoun, *The Whirlpool of Europe, Austria-Hungary and the Habsburgs* (New York, 1906); R. W. Seton-Watson, *The Southern Slav Question and the Hapsburg Monarchy* (London, 1911); H. W. Steed, *The Hapsburg Monarchy* (New York, 1913). See genealogical table of the Hapsburg family.

HAP′TERA (Neo-Lat. nom. pl., from Gk. ἅπτειν, *haptein*, to fasten): A botanical term denoting organs for attachment that contain no vascular bundles, and are therefore not roots. They occur on various marine algæ, on the tendrils of *Ampelopsis*, etc.

HAPTOTROPISM. See Thigmotropism.

HARADA, hä′rä′dä′, Tasuku (1863–). A Japanese educator, descended from a *samurai* family of Kumamoto. He was educated at Doshisha College, Kyoto, and at Yale University; was pastor of Congregational churches in Kobe, Tokyo, and Kyoto, and edited Japanese Christian weeklies; in 1907 became president of the Doshisha University, and in 1910 lectured in several American colleges. He received honorary degrees from Edinburgh University and from Amherst College. Besides his writings in Japanese, he published in English *The Faith of Japan* (1914), the Hartford-Lamson (Hartford Theological Seminary) lectures on religion.

HARAHAN, hăr′ȧ-hăn, James Theodore (1843–1912). An American railroad official, born at Lowell, Mass. He was educated in the public schools, began railroad work as a switchman in 1864, and by 1883 had risen to be general superintendent of the Louisville and Nashville Railroad. For part of a year (1885) he was superintendent of the Pittsburgh division of the Baltimore and Ohio, but he returned to the Louisville and Nashville as assistant general manager—the corresponding position on the Lake Shore and Michigan Southern he held from 1888 until 1890, when he was elected second vice president of the Illinois Central. As a result of the struggle for the control of the Illinois Central between E. H. Harriman and Stuyvesant Fish, Harahan in 1906 became president of the road, in the interest of Harriman, who won the contest. He was killed in a railroad wreck.

HARA-KIRI, hä′rȧ-kē′rē (Japanese, belly-cut), or, more elegantly, **SEPPŪKŬ,** sĕp-po͞o′ku (the Japanese pronunciation of *Ts'ich-fuh,* to cut belly). Self-disembowelment; a form of suicide permitted in feudal Japan among the territorial nobles and samurai (q.v), when unwilling to survive some disgrace. From being a custom, it had, about 1500 A.D., developed into a privilege, so that noblemen and gentlemen could demand that the form of judicial punishment be death at their own hands instead of dying like common criminals. The ceremonies and etiquette of *seppúkŭ* became very elaborate, and this form of judicial suicide degenerated into execution at the hands of one's best friend. Arrayed in the neatest of clothing, in a measured space, behind white curtains, the victim and his friends and the official witnesses took their places. The dirk was laid upon a tray and presented by the second, while at the moment of incision, or while the principal was stretching out his hand to seize the dirk, the "best man" or friend of the accused (*Kaishaku* in Japanese) took off the latter's head with a sweep of his sword. Then, the official witnesses having inspected and identified the head, it was reverently washed by friends. With the decay of feudalism, hara-kiri as a privilege has fallen out of use, but it still survives as a type of voluntary suicide. The main motives for voluntary hara-kiri are loyalty to a dead superior, avoidance of a dishonor in battle, and protest against a false national policy. For instance, the motive of the suicides of General Nogi and his wife on the evening of the funeral of the late Emperor is generally understood to have been their loyalty to the dead superior. During the Russo-Japanese War the officers in command of the troops on the transport *Kinshu-maru* on her way from Japan to Manchuria committed hara-kiri when their boat was captured by a Russian man-of-war which came down quite unexpectedly from Vladivostock. The motive in this case was to avoid the dishonor of captivity. The motive of an indignation at what was deemed a false national policy is manifested by the fact that fully a score of men committed suicide in the orthodox method of hara-kiri, when the dissatisfactory terms of the peace negotiations at the end of the wars with China and with Russia were reported. *Harri-karri,* a form of the word "hara-kiri," which is frequently found in newspapers and more pretentious publications, is erroneous, as is the translation "happy dispatch." Consult: Mitford, *Tales of Old Japan* (London, 1876); Chamberlain, *Things Japanese* (ib., 1891); Gulick, *Evolution of the Japanese* (New York, 1903); Longford, *The Evolution of New Japan* (ib., 1913).

HAR′ALD, or **HAR′OLD, I,** surnamed Haarfagr, or Fair-Haired (c.850–933). King of Norway from about 860 to about 930. He was a descendant of the ancient race of the Ynglings, and the son of Halfdan the Swarthy, the most powerful of the many jarls or petty kings who then ruled in Norway. According to the popular saga, Harald was induced to attempt the subjugation of the whole of Norway by his love for a beautiful maiden, named Gyda, who declared that she would not be his wife until he was sole King of the country; and he swore that he would neither cut nor comb his hair till he had subdued all the land to his sway—an oath which he kept. After many years' contest with his brother jarls, and after defeating the last general confederacy of the independent Norwegian chieftains in a naval battle at Hafrsfjord, he remained sole ruler of the land (872). Harald's severity compelled the deposed rulers to seek other homes; and his reign is memorable for the many new settlements which were made by these exiles in the Orkneys, the Hebrides, the Shetlands, the Faroe Islands, and Iceland, which, except Iceland, were also subdued by Harald. (See Normans.) Although a barbarian, Harald ruled with a sound policy in advance of his age, and by his firmness succeeded in suppressing for a time the private warfare and sea piracy which had prevailed in Norway before his reign. The dissensions of his numerous sons, however, checked all the good that might have resulted from his measures. To restore concord in his family, he divided his dominions among his children, but vested the supreme power in his eldest son, Eric Blodöks, or Bloodaxe (c. 930). Harald died about 933. Consult: Boyesen, *Norway* (New York, 1886); Bugge, *Vikingerne* (Copenhagen, 1906); C. Young, *Harald, First of the Vikings* (New York, 1911).

HARALD, or **HAROLD, III,** surnamed Haardraade, or Hard Ruler (1015–66). King of Norway from 1046 to 1066. He was the son of Sigurd Syr, King of Ringerike, and a descendant of Harald I. In his boyhood he was present at the battle of Stiklestad in 1030, in which his brother, Olaf, King of Norway, surnamed the Saint, was slain. Harald subsequently went to the court of Jaroslaff, Grand Prince of Novgorod and Kiev, and afterward to Constantinople, where he became captain of the Varangian bodyguard of the Greek Emperors. In this office he experienced many marvelous adventures, which have supplied abundant materials for the narratives of the older sagas and the modern romances of the North. According to these, he took part in the expedition against the pirates of the Mediterranean and visited Jerusalem, where he fought successfully against the Saracens, whom he also defeated in 18 pitched battles in Sicily and Africa. On his return to Constantinople he is said to have drawn upon himself the vengeance of the Empress Zoë by an intrigue with her relative, Mary, after he had rejected Zoë's proffered love. He escaped with difficulty from prison, where he had been thrown on a charge of treason, returned to Russia (1044), married the daughter of Prince Jaroslaff, and took her with him to Norway (1046), where his nephew, Magnus, the son of St. Olaf, agreed to divide the royal power with him in return for a share of his treasures. The death of Magnus (1048) left him sole King of Norway. His unruly spirit would not, however, suffer him to rest, and he entered into a war to dethrone the King of Denmark. Although he was successful in battle against the Danes, he gained no real advantages by the contest; and in 1064 he concluded a peace in which he recognized the right of Sweyn, the nephew of Canute, to the throne of Denmark. In 1066 he landed in England to aid Tostig (q.v.) against his brother Harold, King of England, but was slain in battle at Stamford Bridge. Consult Boyesen, *Norway* (New York, 1886), and Munch, *Det Norske Folks Historie*, vol. ii (Christiania, 1855).

HA′RAM (Ar. *ḥarām*, that which is sacred, set apart, or prohibited). The term applied to the ground around a mosque, and particularly the area about the mosques at Mecca, Medina, Jerusalem, and Hebron, the four holy cities. The sacred boundary of Mecca is marked by pillars on all sides, except on the Jidda and Jairana roads, where there is some dispute as to the exact limits. It is not lawful to carry arms or to fight within these limits. According to Burton, the diameter of the Haram of Medina is from 10 to 12 miles. (*Personal Narrative of a Pilgrimage to El Medinah and Meccah*, vol. i, p. 362, London, 1855.) The ground inclosed by the walls around the mosques at Jerusalem and Hebron is counted as belonging to the Haram.

HA′RAN, or **HAR′RAN**, or **CHAR′RAN** (Ass. *Kharranu*, road). A city in northern Mesopotamia and southeast of Edessa, at the junction of the Damascus road with the highway from Nineveh to Carchemish. For the Assyrians it became a strategic position of first-rate importance and is mentioned in inscriptions as early as the time of Tiglath-pileser I (c.1140–1105 B.C.). Sargon II (722–705 B.C.) refers to his having restored the ancient privileges of the place, and later kings, like Asurbanipal (668–625 B.C.), devoted themselves to the restoration of the temple to the moon god, which enjoyed a high reputation as a place of pilgrimage. Haran, the Carrhæ of the Greeks and Romans, became, by virtue of its situation, the centre of considerable commerce. The temple was destroyed by the Medes when they put an end to the Assyrian Empire in 606 B.C., but was rebuilt by Nabonidus (556–539 B.C.). Pognon thinks that the city was destroyed in the time of the Achæmenian kings, and that the inhabitants built a new city farther to the south, the old town being represented by the ruins at Eski-Harran, or Old Harran. It was near the new city that the Roman general Crassus, in his eastern expedition, was attacked and slain by the Parthians (53 B.C.), and here also the Emperor Caracalla was murdered at the instigation of Macrinus, 217 A.D. The place retained its importance down to the period of the Arab ascendancy. While Edessa became a Christian city, Haran continued to be pagan, but enjoyed toleration under Moslem rule by claiming to be Sabian. (See Mandæans.) According to the Book of Genesis, Haran was the first resting place of Terah and his family, after their migration from Ur of the Chaldees, and here Terah died before Abraham's migration into Canaan (Gen. xi. 31–32). The story recalls the tradition of the sojourn of some clans associated with Hebrews at some remote period. Consult: Chwolson, *Die Ssabier und der Ssabismus* (St. Petersburg, 1856); Mez, *Geschichte der Stadt Harran* (Strassburg, 1892); Sachau, *Reise in Mesopotamien* (Leipzig, 1899); Pognon, *Inscriptions sémitiques* (Paris, 1907); Margoliouth, art. "Harranians," in Hastings, *Encyclopædia of Religion and Ethics*, vol. vi (New York, 1914).

HARAR, hȧ-rär′. See Harrar.

HARATIN, hä′rȧ-tēn′. "Black" Berbers, living on the southern slopes of the Atlas Mountains. Their darker complexion is doubtless owing to mixture with negroes. They are interesting to the ethnologist in that they still preserve the patriarchal tribal state. See Berber.

HARAUCOURT, ȧ′rō′ko͞or′, Edmond (1857–). A French poet and novelist, born at Bourmont (Haute-Marne). His first work, *La légende des sexes, poèmes hystériques* (1883), under the pen name "Le Sire de Chabley," attracted some attention. He was originally a symbolist poet. *L'Ame nue* (1885), a collection of verse, in which some of the earlier poems were included, and *Seul* (1891) showed the poet's increasing power and melancholy charm. He also wrote the romance *Amis* (1887); *Shylock* (1889), adapted from Shakespeare's famous play; the *Passion* (1890), a drama; *Héro et Léandre* (1893); *Alienor*, an opera; *Don Juan* (1894); *Elisabeth* (1894); *Les Oberlé* (1905), a play from the novel by Réne Bazin; *Les Benoît* (1905); *La peur* (1907); *Trumaille et Pellisson* (1908).

HARBAUGH, här′bạ, Henry (1817–67). An American clergyman of the German Reformed church, born near Waynesboro, Pa. He studied in Mercersburg Seminary, where he became professor of theology in 1863. He was the chief exponent of the "Mercersburg theology" (q.v.). From 1850 to 1866 he was the editor of the *Guardian*, a monthly magazine, and in 1866–67 of the Mercersburg *Review*. He published some poems in "Pennsylvania Dutch" and also wrote: *Heaven* (3 vols., 1843–53); *Union with the Church* (1853); *Birds of the Bible* (1854); *The Fathers of the German Reformed Church* (1858); *The Golden Censer* (1860); *Christological Theology* (1864).

HAR′BEN, Will(iam) N(athaniel) (1858–). An American story-writer. Born at Dalton, Ga., he was educated privately; until 1888 was in business in the South; and in 1891–93 was assistant editor of the *Youth's Companion*. He was elected a member of the National Institute of Arts and Letters. Besides short stories published in the *Century*, *Harper's*, and other magazines, he is author of *Almost Persuaded* (1890); *A Mute Confessor* (1891, 1899); *The Land of the Changing Sun* (1894); *The Carruthers Affair* (1898, 1899); *Northern Georgia Sketches* (1900); *From Clue to*

Climax (1901); *Abner Daniel* (1902); *The Georgians* (1904); *Pole Baker* (1905); *Mam' Lindy* (1907); *The Redemption of Kenneth Galt* (1909); *Dixie Hart* (1910); *Paul Rundel* (1912); *The Desired Woman* (1913); *The New Clarion* (1914).

HARBIN, här-bēn′, or **KHARBIN**, kär-bēn′. A city of Manchuria, situated on the right bank of the Sungari River, in the Province of Kirin, at the point where the Manchurian Railway to Vladivostok bifurcates, a branch extending to Port Arthur and Peking. It is 615 miles northeast of Port Arthur and 350 miles northwest of Vladivostok (Map: China, N 2). It is a "fiat city," created in 1896 by the Russian government to serve as a railway administration centre and military depot for the control of Manchuria. It consists of the old (or native) town, the harbor (or river) town, also called Prestin, and the administration town. The last two are almost exclusively Russian and consist of new and substantial brick houses, among which are a number of large and pretentious public buildings. There are three hotels, a technical and a commercial school, a theatre, hospitals, and among financial institutions a branch of the Russo-Chinese Bank. By the end of 1903 considerable commerce and industry had sprung up. Harbin was officially opened to the trade of the world on Jan. 14, 1907, according to the terms of the Chino-Japanese Treaty of December, 1905. Exports from Harbin consist mainly of grains, furs, and soy beans; in 1912 to the value of 6,223,593 haikwan taels (haikwan tael = $0.726). Consulates of Great Britain, United States, France, Russia, and Germany are established there. Besides the extensive railway shops there are 18 flour mills in operation with modern machinery, several breweries, distilleries, meat-packing establishments, brick and sugar factories. Five candle factories were in operation in 1912. Steamers leave daily for the Amur, and the railway traffic is extensive. The population was estimated in 1913 at 68,000, of which more than 50 per cent were Russians. During the war between Russia and Japan, Harbin was an important military base of the Russians. The Chinese suburb, also called Fuchiatien, suffered terribly in the plague of January–March, 1911.

HAR′BOR (ME. *harbor, herbore, herberwe, herberge*, Icel. *herbergi*, OHG. *heriberge*, Ger. *Herberge*, from OHG. *heri*, Ger. *Heer*, AS. *here*, army + OHG., Ger. *bergen*, AS. *beorgan*, to shelter). A naturally or artificially protected roadstead on ocean, lake, or river, for the safe anchoring or berthing of ships, either as a temporary refuge from storms (harbors of refuge) or for the transshipment of goods and passengers (commercial harbors). The harbor is strictly only the area of water with the works necessary for its formation, protection, and maintenance, such as breakwaters, jetties, etc. Thus, a port is made up of the harbor, and the freight and passenger handling structures and machinery, such as the wharves, quays, docks, cranes, terminal railways, etc. In common engineering parlance, however, harbor works include all of the structures and appurtenances which facilitate the safe anchorage, loading, unloading, and repairs of vessels which seek the harbors in the way of commerce or safety from storm. This article will be devoted to the broad question of harbor construction; for detailed consideration of the various parts making up a harbor, see Breakwater; Dock; Jetty; Lighthouse; Quay; etc.

Harbors of refuge are provided on stormy coasts for the convenience of passing shipping and may or may not be a part of a port. Such a harbor, exclusively a harbor of refuge, has been built by the United States government at Sandy Bay, near Cape Ann, on the coast of Massachusetts. (See Breakwater, for description.) Commercial harbors are among the fundamentals of transportation and are a part, more or less highly developed, of every water-bounded city.

History. Harbors existed in the earliest stages of civilization, as soon as man began to venture onto the ocean. Cities sprang up at the locations on the seacoast where nature had provided an inlet or bay protected from the severity of the open ocean and at the same time accessible to the productive interior. Gradually, however, man began to devise artificial means of protection, mainly in the way of breakwaters, and many of the early seaports were of this class. Probably the earliest harbors were those built by the Phœnicians, who improved the Levantine coast ports for their extensive commercial operations. At Tyre two harbors were formed—to the north and to the south of the peninsula on which the city was placed. At Sidon similar but less extensive works long testified to the wealth and engineering genius of the Phœnicians. Carthage, in another part of the Mediterranean, also possessed a harbor, though its site is not very satisfactorily determined. It was in two divisions, formed by moles; time, however, has dealt so hardly with it that few traces remain. In Greece nature provided so many navigable inlets that little remained to be done by man. Nevertheless some minor works were executed at the Piræus and elsewhere, chiefly for warlike purposes. The Romans, finding ships necessary to the dominion of the world, set about constructing harbors for them. The coasts of Italy still show how well they understood both the principles and the practice of this branch of engineering. A distinguishing feature of their harbor making is the open or arched mole. Built with open arches, resting upon stone piers, it gives full play to the tidal and littoral currents, thus preventing the deposit of sand or mud; but in proportion as this advantage is increased (by increasing the span of the arches), so also is the agitation, and consequent insecurity, of the water within.

The decay of commerce and civilization consequent upon the fall of the Roman Empire put a stop to harbor making; nor did the art revive until the revival of commerce by the Italian republics of the Middle Ages. The rich traffic of Venice and Genoa soon led to the construction of suitable ports at those places; and the moles of the latter city, and the works in the lagoons of Venice, remain to this day. France was next in the field, embanking, protecting, and deepening the mouths of the rivers along her northwestern shores, as at Havre, Dieppe, Dunkirk, etc. In 1627, during the siege of La Rochelle, Metezeau constructed jetties of loose rubblestone, to prevent access to the city. England lagged far behind her continental rivals. With few exceptions, her ports were absolutely unprotected, or rather uncreated, until late in the eighteenth century. Two of the few exceptions were Hartlepool, where a harbor was formed about 1250, and Arbroath, in 1394. In the seventeenth century, at Whitby and Scarborough, also in Yorkshire, rough piers were thrown out, protecting the mouth of the port; while at Yarmouth, in Elizabeth's reign, a north jetty, and subsequently a south one, were formed. An ancient mole existed at Lyme Regis. But the chief efforts of the early English engineers were directed against the shoals and waves of Dover. With the advent of Smeaton, however, things took a different turn; and now few countries surpass Great Britain in the number of artificially improved commercial harbors or in the just appreciation of their importance.

In the United States the first settlements were along the rivers and bays that afforded a natural anchorage, and little was done until Colonial days to improve the natural conditions. Under the English Colonial administration, as the various Atlantic ports grew in importance, the port works, such as wharves, piers, and docks, were brought to what was then a high stage of development, especially in Boston, New York, and Philadelphia, but not much effort was expended in improving the harbors proper, mainly because the leading ports were in natural harbors quite sufficient to care for the small vessels of the day. After the formation of the United States the Constitution vested all harbor rights in the Federal government, and from that time the design, construction, and maintenance of harbors (by that meaning the harbor proper) have been under the jurisdiction of the United States, acting through and by the Corps of Engineers, United States Army. The city and State have control of the port works in so far as these works do not encroach on the harbor. In a number of instances cities and States have supplemented their legally prescribed activities in port construction by assisting the Federal government in the work in the harbor proper, but always under the direction and control of the Federal government.

The Federal harbor work is now classed with river work and is appropriated for by Congress under an annual or biennial "River and Harbor Bill." Theoretically Congress appropriates this money on the advice of the Secretary of War, who in turn is advised by the Corps of Engineers. Actually for many years the "River and Harbor Bill," while embodying many of the unprejudiced recommendations of the Army Engineers, has contained many items for the improvement of harbors, and especially rivers, which are governed entirely by political expediency.

The first regular appropriation for harbor work in the United States was made in 1802; it amounted to $30,000 and was to be devoted to the erection of public piers at Philadelphia, Pa. In 1822 an appropriation of $22,700 was made for the construction of a harbor of refuge in Delaware Bay. The first approach to a river and harbor bill was made in 1826, when about $150,000 was appropriated for carrying on work in about 20 localities. From 1826 to 1838 aggregate appropriations carried by the various river and harbor bills were about $9,000,000. From 1838 to 1866 the aggregate expenditure was $6,600,000. The total amount appropriated up to and including 1913 was $746,927,946.61.

The completion of the Panama Canal led to great activity in harbor construction in the United States during the first decade of the twentieth century on the already busy harbors of Boston, New York, and Philadelphia on the Atlantic coast, Galveston and New Orleans on the Gulf of Mexico, and San Francisco on the Pacific; plans were made for enlargement and betterment operations to continue over a term of years, and, on the Pacific coast particularly, enormous bond issues were floated by cities, to be expended in the creation of entirely new ports or in the modernization of small ports already in existence. The cities of San Francisco, Los Angeles (with its harbor 20 miles from the city), Richmond (in San Francisco Bay), Seattle, Portland, and Vancouver, all spent large sums of money in an effort to catch the prospective commerce through the canal.

In South America, too, there has been a great growth in harbor building, a necessary accompaniment to the commercial development of the continent. Buenos Aires, Rio de Janeiro, Pará, and Valparaiso have now unexcelled harbors, most of which have been artificially developed to a high degree.

Harbor Construction. Topographic and geologic conditions exercise a decisive influence upon the character and arrangement of harbors. A harbor may be situated directly upon the seacoast or in some river, bay, or gulf, or far in the interior on some river or maritime canal. The effects of the ocean, the action of the winds and tides, and the general conformation of the shore lines are other controlling factors in determining the arrangement of harbor works. Finally, the nature of the soil plays an important part in the arrangement of the basins, either natural or artificial, and the adoption of quays, jetties, piers, etc.

The great variety of commercial and natural conditions which influence the arrangement of harbor works of course call for a corresponding variety of arrangements. For the sake of clearness we may somewhat arbitrarily divide harbors into, first, those located on a comparatively open coast; second, those located at river mouths or on bays or gulfs, and thus more or less landlocked; and third, those located well inland on rivers or maritime canals.

The simplest form of open-coast harbor consists of a quay wall or bulkhead wall open to the sea, and serving only to enable ships to tie up alongside the shore and discharge and receive cargoes. Such a quay affords comparatively no protection from the winds, tides, and currents. The next advance is a straight pier extending out from the shore. This pier affords little shelter to ships from waves coming directly inshore, but in case of winds and waves alongshore it affords protection on its lee side. Another step in advance is to build the pier bent or curved with its concave side towards the shore. A still further improvement is to build two curved piers converging towards each other so as to include a harbor basin, with an opening between the sea ends of the piers. Still another method is to build offshore an insular breakwater, which prevents the waves from breaking on the shore and thus forms a comparatively tranquil basin between the breakwater and the shore. Harbors of all these forms are found in practice.

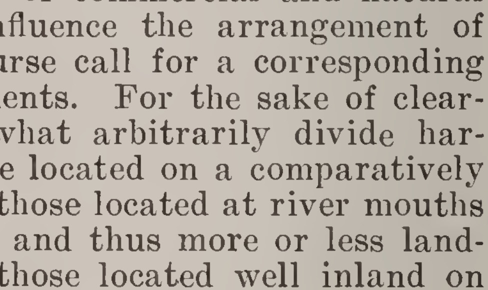


Fig. 1.

More generally, however, two or more of the structures mentioned are combined to form harbor basins of various forms and dimensions. Figures 1 and 2 show in outline form two representative open-coast harbors. When the conformation of the coast line is of the nature of an indentation in the land, as in the case of a bay, gulf, or river mouth, then a portion of it may be utilized, to take the place of one or more of the structures necessary to form an open-coast harbor. For example, the harbor of New York is so inclosed by land that no artificial structures in the shape of breakwaters are needed to secure a tranquil harbor basin. Where the bay or inlet is less perfectly landlocked, breakwaters are constructed to supply the necessary protection at the exposed points. Figures 3 to 6 show actual arrangements of such structures in different circumstances.

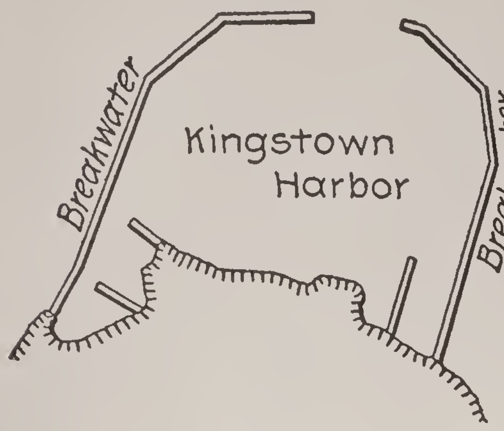


FIG. 2.

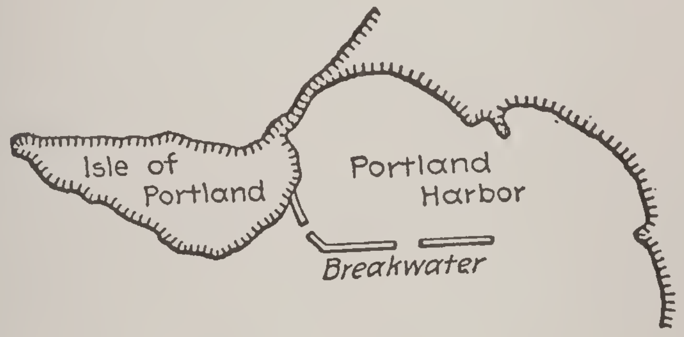


FIG. 3.

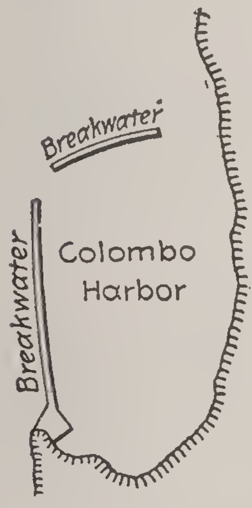


FIG. 4.

The artificial works involved in inland harbors consist of jetties at the mouth of the river or canal, bank protection, and other constructions for preserving the channel, and the building of docks and quays in the harbor proper. Among the notable inland harbors of the world are those of Hamburg, Manchester, and Amsterdam in Europe, and Charleston and Philadelphia in America. Figure 7 shows the entrance harbor of the ship canal leading to the harbor of Amsterdam, and Fig. 8 that at the entrance of the Suez Canal, at Port Said.

In what has preceded, we have concerned ourselves only with the general arrangement of harbor structures under different topographic conditions. For specific information concerning jetties, breakwaters, docks, piers, quays, etc., the reader should consult the articles with these titles. Whatever the construction and arrangement of these constituent structures of a harbor may be, they are such that the harbor consists of an entrance, of an anchorage space, and of docks. By the entrance is meant the navigable pass by which vessels enter the harbor. Some ports have natural entrance channels of large dimensions and great depth, and in other harbors this channel is of small size and has to be artificially constructed and maintained by dredging. In many ports large dredges are kept constantly in service, removing the accumulated silt and sand from the bottom and maintaining the required depth.

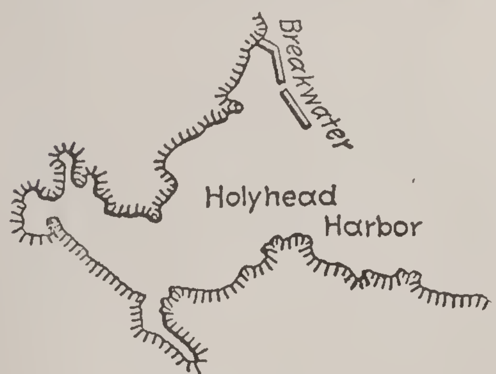


FIG. 5.

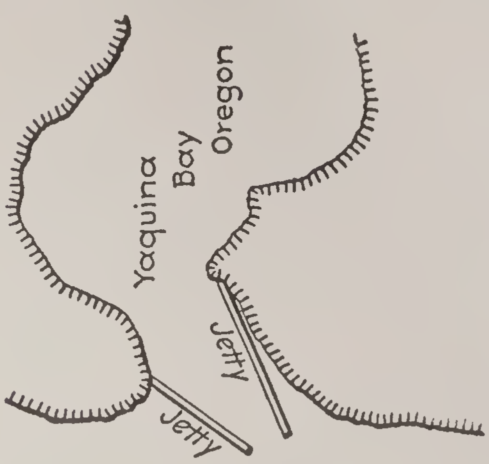


FIG. 6.

In recent years the rapid growth of the large passenger steamers has put an increasing burden on harbor construction in providing proper depth and seaway. It should be recognized, however, that these enormous ships are economical only for those passenger lanes where constant traffic can be maintained, such, e.g., as the New York-Europe route. Designing minor ports for 1000-foot liners is apt to prove a waste of money. Generally speaking, the minimum width of practical entrance for ships of modern dimensions is from 230 feet to 490 feet, but for large commercial ports it should be preferably from 650 feet to 1000 feet wide. Sometimes the entrance channels constitute the anchorage space tributary to the entrance channel and the docks. No general rule can be laid down for the area of anchorage space, for this is governed by the local conditions at each port. When the natural harbor bank does not give sufficient room for the commerce of a harbor, various methods are adopted for increasing this shore space. The most simple is to build out from the shore a series of piers or wharves with water spaces between them to form docks. When this is not practicable, quays are built which inclose dock basins. The nature of these two classes of structure is described in the article DOCK.

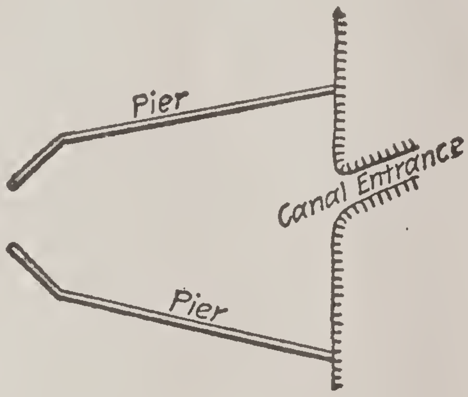


FIG. 7.

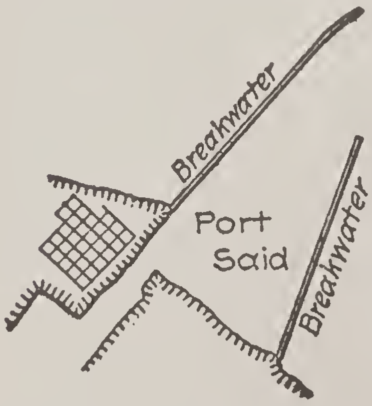


FIG. 8.

For a comprehensive treatise on harbors, consult: Douglas Oucre, *Harbors* (London, 1904); De Cordemoy, *Les ports modernes* (Paris, 1900); Vernon-Harcourt, *Harbors and Docks* (London, 1885); B. Cunningham, *Treatise on the Principles and Practice of Harbor Engineering* (Philadelphia, 1908); Edouard Boin, *La condition économique et administrative des ports français* (Lille, 1909). The best descriptions of important recent harbor works will be found in the proceedings of engineering societies and in the engineering papers.

HARBOR. As judicially defined, a place to shelter ships from the violence of the sea, and where ships are brought for commercial purposes to load and unload goods and passengers. It includes quays or docks and other instrumentalities for the use and protection of ships. The term is generally considered a legal synonym for "haven" and "port," although at times it is employed in a somewhat narrower sense than either of these terms. It is not necessary, to constitute a harbor, that it be landlocked or absolutely safe for ships. It is enough that it affords a reasonably safe place of retreat from winds and storms.

In Great Britain the right to construct or control harbors is vested in the crown, but at present they are generally owned or managed by boards or commissions under special acts of Parliament. Even when an individual is the owner of a harbor, under a grant from the crown or by proscription, he holds it subject to the right of the public to make use of it and of the state to control it. The government has the power, also, of closing particular harbors or ports, either absolutely or to certain lines of imports or exports. It has the power, too, of regulating all harbor fees and the conduct of business transacted in harbors. At present the various boards or commissions are authorized by Parliament to make all needful regulations and, within certain limits, to fix the charges on goods and ships. It is their duty, on the other hand, to keep the harbors in a reasonably safe condition for those entitled to use them. If they do not, they are liable for any injury which results from their negligence. This rule does not obtain in harbors controlled directly by the government and known as the King's harbors. Here the maxim applies that "the King can do no wrong"; i.e., the state cannot be sued without its consent for injuries due to its negligence.

In the United States the development and control of harbors are shared to some extent by the Federal and the State governments, and in some instances are committed to the local municipal authorities. Large appropriations are frequently made by Congress for the improvement and defense of harbors, and the Federal government, under its power to regulate foreign and interstate commerce, exercises a large degree of control over most ports. On the other hand, the ownership of docks, wharves, warehouses, and other harbor facilities afforded to commerce, is generally a matter of State legislation. Each State, too, has its pilot laws, its quarantine rules, and its harbor regulations, with which the Federal government does not interfere, but which are subject to Federal laws so far as the subject—as quarantine, e.g.—is within the Federal jurisdiction.

A *harbor master* is a State official with extensive authority. He has power to regulate the times of landing, unloading, and loading vessels, to make room for such as need to be immediately accommodated by temporarily removing others, to collect harbor fees, to enforce obedience to his lawful orders, and, in certain cases, to settle disputes between the masters of vessels. In some States a board of harbor commissioners is provided for with large powers of control. Consult: Moore, *History of the Foreshore and the Law Relating thereto* (London, 1888); *United States Statutes at Large*, 1150, Act of March, 1899; Birdseye, *General Laws of New York—Navigation Law and New York Harbor* (New York, 1901); W. W. Pierson, *Port Administration and Harbor Facilities* (Philadelphia, 1907); *Laws of the United States Relating to the Improvement of Rivers and Harbors, 1790–1907* (2 vols., Washington, 1907).

HARBOR GRACE, grās. A town and port of entry on the west side of Conception Bay, Newfoundland, 26 miles (direct) west by north of St. John's and about 60 miles by rail, and on the Newfoundland Railroad (Map: Newfoundland, G 5). It has a large harbor, with a patent slip 260 feet long, and the wharves are protected by the beach. Its trade is nearly one-fourth that of the entire island. It manufactures boots, shoes, and oil. Pop., 1901, 5184; 1911, 4279.

HAR'BORING. In law, the act of receiving and retaining a person in violation of the rights of another or of the public. Harboring the wife of another after notice from the husband not to do so is an actionable wrong against him, unless such act is a proper one for her protection. So the harboring of an apprentice or servant, with knowledge of the latter's obligation to his master, is an actionable tort at common law. One who knowingly harbors a felon becomes at common law an accessory to the crime, while the intentional harboring of one who has committed a misdemeanor is punishable as a conspiracy to defeat justice. An innkeeper who is accustomed to harbor thieves is indictable at common law for maintaining a public nuisance. Some modern statutes make it criminal for any one to harbor thieves, i.e., to shelter them or permit them to congregate on his premises. Other statutes impose a penalty for harboring seamen, knowing them to be deserters from a vessel. Under such statutes, and generally, the offense of harboring does not necessarily involve the element of secrecy or concealment. It is committed by merely sheltering or entertaining the prohibited person or permitting him to take refuge under one's roof. See ACCESSORY; HUSBAND AND WIFE; MASTER AND SERVANT; PARENT AND CHILD; and authorities there cited.

HARBOR MASTER. See HARBOR.

HAR'BORNE, WILLIAM (c.1545–1617). An English traveler and diplomat, the first English Ambassador to Turkey, born at Yarmouth. In 1575 he was elected to Parliament, but was not allowed to take his seat, and in 1577 he went to Turkey. Five years afterward he was appointed Ambassador to that country. The Turkey Company, formed in 1579, received, through his efforts, larger privileges than any other chartered company. He left Constantinople in 1588 and died at Mundham. An account of his journey from Constantinople in 1588 was printed in Hakluyt's *Collection of Voyages*, as well as the description of his outward voyage.

HARBOR SEAL. The common seal (*Phoca vitulina*) of all northern seas, which formerly frequented numerously all the bays and harbors of the Atlantic coast as far south as Virginia, but now is uncommon south of Nova Scotia. Stragglers, nevertheless, are still seen at long intervals in the Hudson and even in the Delaware rivers, where they once regularly ascended as far as tidewater went. It is still numerous in the St. Lawrence and has been taken in Lake Champlain. The leopard seal of the Pacific coast (south to southern California) is the same and has been known to ascend the Columbia 200 miles. This seal attains a total length of about

5½ feet and a weight of from 80 to 100 pounds. Brownish yellow with dark spots is the commonest color, but many variations occur, such as almost uniform dark brown, nearly black, and dark spotting on a light ground, or the reverse. It is distinct in habits from other seals, with which, in the North, it never associates on the ice floes, but remains by itself on or near the shore, where it ascends the Arctic rivers almost to their sources in pursuit of the salmon. Hence it is known to seamen as the "fresh-water" seal. The white skins of the young seals are regarded by the northeastern Eskimo as the best and prettiest material from which to make undergarments and the jackets of women and children. This is the common seal of northern Europe and the British Islands. It is often captured young and petted and trained, when it shows great docility and affection, and its tricks are frequently exhibited in public shows.

HARBOR SPRINGS. A village of Emmet Co., Mich., 5 miles north by west of Petoskey, on Lake Michigan and on the Grand Rapids and Indiana Railroad and on several steamship lines (Map: Michigan, D 3). It is a favorite summer resort, attracting annually some 50,000 persons, many of whom have homes in the vicinity. It has an excellent landlocked harbor which furnishes anchorage to many vessels. There are here a Catholic Indian school, a government lighthouse, an Indian mission, established in 1695, and several other places of historic interest. The principal manufactures are lumber in various products. The water works and electric-light plant are owned by the village. Pop., 1900, 1643; 1910, 1805.

HARBURG, här′bu̇rk. The capital of a district in the Prussian Province of Hanover, situated on an arm of the Elbe, over which are built a railroad and a street bridge on the road to Hamburg, which is 7 miles to the north (Map: Prussia, C 2). The most noteworthy building of the town is the old castle on the Elbe. Harburg has a Realgymnasium, several industrial and commercial schools, and a theatre. This place of industrial activity numbers among its products sulphur, petroleum, saltpetre, mineral water, art objects, brushes, lumber, textiles, jute, linseed and coconut oil, gutta-percha and rubber goods, leather, cement, glass, machinery, and boilers. It is headquarters of a forest district and is connected by rail with Hamburg, Cuxhaven, and Bremen, and with Hamburg also by an electric street railway, and has a growing trade in groceries, wine, oil, coal, timber, etc. Harburg obtained municipal rights in 1297, belonged to Lüneburg and Hanover, and passed to Prussia in 1866. The Commune of Eisendorf was incorporated with Harburg in 1910. Pop., 1900, 49,153; 1910, 67,025.

HARCOURT, här′kôrt *or* här′kẽrt, RICHARD (1849–). A Canadian lawyer and statesman. He was born at Seneca, Haldimand Co., Ontario, and was educated at Toronto University. He taught and was public-school inspector for Haldimand, was called to the Ontario bar in 1876, and having been elected (1878) a Liberal member of the Ontario Legislature, retained his seat in that body for 30 years. He was Provincial Treasurer in 1890–99 in the administrations of Sir Oliver Mowat (q.v.) and Arthur Sturgis Hardy (q.v.), and in 1899–1905 Minister of Education in the administration of Sir George William Ross (q.v.). In 1904 he was a delegate to the Educational Congress at St. Louis, Mo. He was made a senator of Toronto University. After 1905 he resumed the practice of law in Welland.

HAR′COURT, SIMON, first EARL (1714–77). An English diplomat and statesman. He was the only son of the Hon. Simon Harcourt, who died in 1720. On the death of his grandfather, Simon, first Viscount Harcourt, in 1727, he succeeded to the family titles and estates. After an education at Westminster School and four years of foreign travel, he was appointed lord of the bedchamber to George II. In 1745 he raised a regiment for defense of the kingdom against the rebels and in 1749 was advanced to the dignity of Earl. Harcourt was appointed governor to the Prince of Wales, afterward George III, but resigned owing to his dislike of the absolutist principles in which the young Prince was instructed. Promoted to be lieutenant general in 1759, he was appointed in 1761 special ambassador to demand the hand of the Princess Charlotte in marriage for the young King, who had succeeded to the throne in 1760. He was made Ambassador to Paris in 1768 and Lord Lieutenant of Ireland in 1772. By a proposal to tax the rents of absentee landlords, he gained much popularity in that country, but the proposal was rejected by the Irish Parliament, which was swayed by English opinion. There was much official corruption during his term as Lord Lieutenant. He resigned in January, 1777, and died September 16 of the same year.

HARCOURT, SIMON, first VISCOUNT (c.1661–1727). An English statesman, born at Stanton Harcourt, and educated at Pembroke College, Oxford. He studied law in the Inner Temple and was admitted to the bar in 1683. He was elected as a Tory member of Parliament in 1690, in 1705, in 1708, but was unseated, and again in 1710. In 1701 the House of Commons selected him to impeach Lord Somers at the bar of the House of Lords; in 1702 he was appointed Solicitor-General and was knighted; and in 1707 and 1710 he was Attorney-General. Becoming Lord Keeper of the Great Seal and member of the Privy Council in 1710, he presided over the House of Lords, although it was a year later that he was created Baron Harcourt. In 1713 he was Lord Chancellor. He obtained the acquittal of the Earl of Oxford in 1717, was created Viscount and readmitted to the Privy Council in 1722, and procured the pardon of Lord Bolingbroke in 1723. Consult: Burnet, *History of my Own Time* (London, 1833); Foss, *Judges of England*, vol. viii (ib., 1870); Campbell, *Lives of the Lord Chancellors* (New York, 1874–75); *Dictionary of National Biography*, vol. xxiv (London, 1890).

HARCOURT, WILLIAM, third EARL (1743–1830). An English field marshal. His military career began at the age of 16, when he took command of a troop raised at his father's expense and known as Harcourt's Black Horse. He was aid-de-camp to Lord Albemarle at the siege of Havana (1762), but returned home to represent Oxford in Parliament (1768–74). He was a lieutenant colonel of dragoons in the American Revolutionary War and distinguished himself in the capture of Gen. Charles Lee, near the Delaware. During the war in Flanders he was raised to the command of the Duke of York's cavalry (1795), was made a general the following year, as well as head of the Royal Military College, Great Marlow, a position he held from its opening until 1805, and he was created field marshal on the occasion of the coronation of George IV.

HARCOURT, Sir William George Granville Venables Vernon (1827–1904). An English statesman. Descended from the Plantagenet royal family, he was born at York, Oct. 14, 1827. After nine years of preparation as the pupil of Canon Parr, he entered Trinity College, Cambridge, in 1846 and graduated in 1851 with a first-class in classics and as senior optime in the mathematical tripos. He studied law at Lincoln's Inn, began the practice of his profession in 1854, and in 1866 was appointed queen's counsel. From 1855 to 1859 he wrote continuously for the *Saturday Review,* and during the American Civil War he wrote to the *Times,* over the signature Historicus, a number of letters, in which with telling arguments he opposed the recognition of the Southern States as belligerents. From 1868 to 1880 Harcourt represented Oxford in the House of Commons; from 1880 to 1895, Derby; and from 1895 until his death West Monmouthshire had him as a representative. His principles were thoroughly liberal. His election to the professorship of international law in the University of Cambridge in 1869 is evidence of scholarship in his special field of study; so, too, was his appointment to the royal commission for amending the neutrality laws and to the royal commission for amending the naturalization laws. In 1873 he was appointed Solicitor-General and was knighted. He was Secretary of State for the Home Department (1880–85) and Chancellor of the Exchequer (1886 and 1892–95). As Home Secretary, he introduced in 1884 an important bill for the reform of the municipal government of London. The budget which he, as Chancellor of the Exchequer, presented in 1894 made the income tax considerably more graduated, and reformed the "death rates." This budget is often mentioned as his greatest work. On the retirement of Gladstone in 1894 Harcourt became leader of the Liberal party in the House of Commons, but his views were often at variance with those of the Prime Minister, Rosebery, and on this account he retired in December, 1898, and subsequently freely criticized the government. He died at Nuneham, Oxfordshire, Sept. 30, 1904. Consult: McCarthy, *A History of our Own Times* (London, 1879–80) and *British Political Portraits* (New York, 1903); Morley, *The Life of William Ewart Gladstone* (ib., 1903); Paul, *A History of Modern England* (ib., 1906); Armstrong, in *The Dictionary of National Biography,* vol. ii, 2d supp. (ib., 1912).—His son, Lewis Harcourt (1863–), succeeded to his father's seat in the House of Commons in 1904, became Privy Councilor in 1905, from 1905 to 1910 was First Commissioner of Works, and accepted a seat in the Asquith cabinet in 1910 as Secretary of State for the Colonies. He married Miss Mary Ethel Burns, of New York City, in 1899.

HARCOURT, William Vernon (1789–1871). An English scientist and clergyman, born at Sudbury, Derbyshire. After serving five years in the navy at the West Indian station, he entered Christ College, Oxford, in 1807, graduated in 1811 (M.A., 1814), and took up clerical duties at Bishopthorpe, Yorkshire. He became interested in chemistry while at Oxford; subsequently he had a private laboratory constructed, and in 1824 his scientific achievements earned him election as fellow of the Royal Society. At the first meeting of the British Association for the Advancement of Science, held in 1821, Harcourt as secretary drew up plans of proceedings and laws, thus becoming virtual founder of the society, and in 1839 he was elected its president. Meanwhile he continued his pastoral work, becoming canon of York in 1824, rector of Wheldrake, Yorkshire, in 1824, and of Bolton Percy, Yorkshire, in 1837. He also established the Castle Howard Reformatory and the Yorkshire School for the Blind.

HARDANGER (här′däng-ẽr) **FIORD.** An inlet of the Province of South Bergenhus, Norway, on the southwest coast (Map: Norway, C 7). It is about 68 miles long and extends northeastward and south, encircling the Folgefond. With a regular steamboat service it is a notable visiting place for summer tourists, owing to its wild and picturesque scenery, embracing mountain peaks, many tributary fiords, lofty cliffs, waterfalls, and on the east the Hardanger Fjeld, an elevated ice-clad plateau. The principal stations maintain hotels. The narrow strips of well-cultivated land along the shores are densely populated by the Harænger, a people distinguished for their interesting national customs and dress.

HARD CASH. See Very Hard Cash.

HARD′CASTLE. A family, the members of which are principal characters in Goldsmith's *She Stoops to Conquer.*

"HARD CIDER CAMPAIGN." See Harrison, W. H.

HARD CLAM, or **ROUND CLAM.** The quahog. See Clam.

HAR′DECANUTE′, HARDACNUT, or **HARTHACNUT** (c.1019–42). King of England and of Denmark. He was the son of Canute the Great and Emma of Normandy and at the time of his father's death (1035) was ruling as underking in Denmark. Canute had intended the crown of England for Hardecanute, but the English Witan decided that his half brother Harold should be King of the North, and Hardecanute should have only Wessex. As Hardecanute neglected to take possession of his kingdom, it passed to Harold in 1037. On the latter's death, however, in 1040, Hardecanute was chosen King of England by the Witan. He arrived in England with a fleet of 60 ships, for the maintenance of which he extorted a heavy *danegeld.* He was coarse and violent in his habits and unscrupulous in the means he adopted for the establishment of his power. His reign was peaceful. He died June 8, 1042, at the marriage banquet of one of his nobles, and with him ended the Danish line in England. He was succeeded by his half brother, Edward the Confessor (q.v.). Consult: Freeman, *The Norman Conquest,* vol. i (Oxford, 1872); Oman, *England before the Norman Conquest* (New York, 1910); Hodgkin, *History of England from the Earliest Times to the Norman Conquest* (London, 1906).

HAR′DEE, William Joseph (1815–73). An American soldier, prominent on the Confederate side in the Civil War. He was born in Savannah, Ga., graduated at West Point in 1838, and served with distinction through the Seminole and Mexican wars. At the outbreak of the Civil War he resigned from the United States army to accept a commission as colonel in the Confederate service, and during the first year of the war held various commands in the West. The next spring he commanded a corps in the Army of Mississippi, and at Shiloh, April 6, 1862, led the first Confederate line of battle. During Bragg's invasion of Kentucky in the following September he commanded the left wing of the invaders and later took a prominent part in the battles of Perryville and of Murfreesboro. By this time he had attained the rank of lieutenant general. In the summer of 1863 he was placed in charge of the defense of Mississippi and Alabama, but rejoined the army in time to command his corps at the battle of Missionary Ridge. Soon after this, Dec. 2, 1863, he succeeded General Bragg in command of the Army of Tennessee, but was himself replaced by Polk on December 23, who, however, gave way to Joseph E. Johnston on December 27. Under General Johnston, Hardee fought through the Atlanta campaign, and after the fall of Atlanta was assigned to the command of the Department of South Carolina, Georgia, and Florida. His forces, largely composed of the local militia, were unable to make any effectual opposition to Sherman's march to the sea; and it was only by good generalship that Hardee was able to escape from Savannah before the Federal forces had completed its investment. He thereupon retreated northward through the Carolinas and effected a junction with Johnston, under whose command he continued to serve until that general surrendered on April 26, 1865. After the war he became a planter at Selma, Ala. He was the author of *Hardee's Tactics*, a manual said to have been drawn largely from French sources.

HARDELOT, är'd'-lō', Guy d' (?–). The professional name of Mrs. Helen d'Hardelot Rhodes, a French-English song composer. She was born at Hardelot Castle, Pas de Calais, France, of French, English, and Irish ancestry, was educated in Paris, and studied music there at the Conservatoire with Renaud Maury. She accompanied Madame Calvé on a six months' tour of the United States in 1896. Afterward, having married an Englishman, she made London her home. Her songs are pleasing and melodious without depth or originality. When Melba, Calvé, and Plançon sang them, they enjoyed for a time great popularity.

HAR'DEN, Maximilian (1861–). A German journalist and author, born in Berlin. After a secondary education he became a contributor of essays and critiques on subjects of literature and the drama to the *Frankfurter Zeitung*, the *Gegenwart*, and the *Nation*. He first attracted attention by a series of articles on social and political topics, published originally in the *Gegenwart*, with the signature Apostata, and subsequently in two volumes, with the title *Apostata* (1892). In 1892 he established the *Zukunft*, a very successful weekly, and in 1896 published *Theater und Litteratur*. His individual and witty Heinesque style and his unreserved expressions of opinion, especially against Caprivi, made him *persona non grata* to the government. In 1889 he was active with Otto Brahm in establishing a Free Theatre in Berlin. In 1900 he was condemned to six months' imprisonment on the charge of *lèse-majesté*. *Kampfgenosse Sudermann* (1903) is a bitter attack on the noted dramatist. He published also *Köpfe* (new ed., 3 vols., 1910–13).

HARDENBERG, här'den-bĕrk, Albert (1510–74). A Dutch theologian, whose real name was Rizäus, but who is usually called Albert Hardenberg, from his birthplace in Holland. In 1517 he entered a monastic school and about 1530 went to Louvain, where he soon developed a distaste for scholastic theology. At Mainz, where he went to study, he met Johannes Alasco (q.v.) and was turned to Protestant ideas. He returned to Louvain and preached the Reformation in a very mild form, but was forced to leave the city. He taught at Aduard for three years (1540–43) and then, through the efforts of Alasco and of Melanchthon, left the Roman church and went to Wittenberg (1543). Afterward he came under the protection of the Archbishop of Cologne, who was friendly to the Reformation, and was settled as pastor at Kempen. He is best known in Church history for his opposition to Luther's doctrine of ubiquity and for his attempt to introduce Calvinistic tenets on the nature of the elements in the sacrament. In 1561 he went to Bremen, then to Sengwarden, and in 1567 to Emden, where he died. Consult Spiegel, *Dr. Albert Rizäus Hardenberg* (Bremen, 1869).

HARDENBERG, Friedrich von. A German lyric poet. See Novalis.

HARDENBERG, här'den-bĕrk, Karl August, Prince (1750–1822). A Prussian statesman, born at Essenrode, in Hanover, May 31, 1750. He was educated at Leipzig and Göttingen and in 1776–78 traveled in France, Holland, and England. On his return to Hanover he became Councilor of the Privy Chamber and was raised to the rank of Count; but a private quarrel with a member of the royal family induced him, in 1782, to quit the Hanoverian service. He took up his residence at the court of Brunswick, where the Duke appointed him, in 1787, President of the Council of State. Soon afterward he was sent on a diplomatic mission to Frederick William II of Prussia, who received him with marked distinction. In 1790 the Margrave of Ansbach and Bayreuth requested the Prussian monarch to furnish him with a person competent to administer the affairs of his dominions, and Frederick William recommended Hardenberg. When Ansbach and Bayreuth were united with Prussia in 1791, Hardenberg was appointed Minister of State and a member of the cabinet. At the commencement of the war with France the King summoned him to his headquarters at Frankfort-on-the-Main as administrator of the army. Early in 1795 he was sent to Basel, where on April 5 he concluded a peace between Prussia and the French Republic. After the accession of Frederick William III, Hardenberg was recalled to Berlin (1798) and was intrusted with the partial management of foreign affairs. In 1804 he became first Prussian Minister on the resignation of Haugwitz, and in this capacity endeavored to keep Prussia neutral in the war between France and England. Nevertheless, by the victory of Napoleon at Austerlitz, Prussia was compelled to enter into an alliance with Napoleon in the winter of 1805–06. Hardenberg was deprived of his office in April, 1806, and Haugwitz, who was friendly to the French, returned to power. Prussia was driven in the same year to take up arms against Napoleon. After the fatal battle of Jena, Hardenberg accepted the portfolio of Foreign Affairs, which he held for a few months only, Napoleon, who considered him the chief opponent of France in Prussia, demanding his dismissal at the Peace of Tilsit. In 1810 he was appointed Prussian Chancellor. Hardenberg now proceeded to carry out Stein's plan for a regenerated Prussia through the enactment of radical and far-reaching reforms. The victories of the British troops in the Spanish peninsula, and the disasters that overwhelmed Napoleon's vast army in Russia, made it possible for Hardenberg to realize his patriotic efforts, and he had the satisfaction of seeing his plans crowned with success. The War of Liberation freed Prussia. Hardenberg subscribed to the Peace of Paris, May 30, 1814, and was soon after raised to the rank of Prince by his sovereign. He accompanied the allied sovereigns to London and took part in the proceedings of the Congress at Vienna and in the conferences at Paris (1815). In 1817 he reorganized the Council of State, of which he was appointed President. He was present at the meetings of the monarchs of the Holy Alliance at Karlsbad, Laibach, Troppau, and Verona. His later policy showed reactionary tendencies, however, and lost him much of his previous popularity. Germany lost her illusions about him and came to feel he was subservient to Metternich. During a tour through the north of Italy he was taken suddenly ill at Pavia and died at Genoa, Nov. 26, 1822. The services rendered by Hardenberg to his country were great; to him, next to Stein, Prussia is indebted for the improvements in her army system, the abolition of serfdom and feudal burdens, the throwing open of the civil service to all classes, and the complete reform of the educational system. Hardenberg's *Memoirs, 1801–07,* were suppressed until 50 years had elapsed, and were then edited with a biography by Ranke, *Denkwürdigkeiten des Fürsten von Hardenberg* (5 vols., Leipzig, 1877). Consult also: Klose, *Leben Karl Augusts, Fürsten von Hardenberg* (Halle, 1807); Meier, *Die Reform der Verwaltungsorganisation unter Stein und Hardenberg* (Leipzig, 1881); Seeley, *Life and Times of Stein* (London, 1879); Chr. Meyer, *Hardenberg und seine Verwaltung der Fürstentümer Ansbach und Bayreuth* (Breslau, 1892); Koser, *Die Neuordnung des preussischen Archivwesens durch die Staatskanzler Fürsten v. Hardenberg* (Leipzig, 1904).

HARDENBERGH, här′den-bẽrg, Henry Janeway (1847–). An American architect. He was born at New Brunswick, N. J., and studied architecture (1865–70) under Detlef Lienau in New York City, where he entered practice. Among the notable buildings erected from his designs are the Waldorf-Astoria, Manhattan, and Plaza hotels, and the American Fine Arts Society Building—all in New York. He became a member of the National Institute of Arts and Letters, and associate of the National Academy in 1910. He was one of the founders of the American Fine Arts Society and of the Municipal Art Society.

HAR′DEN-HICK′EY, James Aloysius (1854–98). An American adventurer and journalist, called a baron. He was born in San Francisco, but at the age of 23 settled in Paris, where he started a paper called the *Triboulet,* so conspicuous for its strong satirical attacks upon the government that it was suppressed in about two years (1880). The editor had also been drawn into duels with other journalists, but his literary activity continued unabated, and under the nom de plume "Saint-Patrice" he published: *Un amour dans le monde* (1877); *Mémoires d'un gommeux* (1877); *Près du gouffre* (1877); *Sampiero* (1878); *Lettres d'un Yankee* (1879); *Aventures merveilleuses de Nabuchodonosor Nosebreaker* (1880); *Les facéties de Trogneville* (1883); *Nos écrivains* (1888); *La théosophie* (1890); *Plagiats bibliques* (1891).

HARDERWIJK, här′dẽr-wīk. A small seaport and fishing town of the Netherlands, situated on the southeastern shore of the Zuyder Zee, 28 miles east of Amsterdam (Map: Netherlands, D 2). It is a fortified town and a recruiting station for the Dutch East India troops. The chief exports are grain, lumber, and fish. Pop., 1900, 7425; 1910, 7415. The fifteenth-century parish church possesses a remarkable square tower. Harderwijk was a Hanse town and from 1648 to 1811 was the seat of a university.

HAR′DESTY, Irving (1866–). An American anatomist. He was born at Beaufort, N. C., graduated in 1892 from Wake Forest College (North Carolina), and gained his Ph.D. in 1899 at the University of Chicago, where he was an associate in anatomy (1899–1900). He served as principal of Wakefield Academy in 1892–93, taught at the University of Missouri in 1895–96, and at the University of California, where he rose to be associate professor in 1906; and in 1909 he became professor of anatomy, in charge of the department, at Tulane University. Besides his researches on the nervous system, he published: *Neurological Technique* (1902); "The Nervous System," part iii of Morris's *Human Anatomy* (1907, 1914); *A Laboratory Guide for Histology* (1908).

HARD′HACK. See Spiræa.

HARD′HEAD. A fish. 1. See Halfbeak. 2. See Steelhead. 3. A sailors' name for the California gray whale (q.v.), said to be due to its propensity for striking and upsetting the whalers' boats with its head.

HARDICANUTE. See Hardecanute.

HAR′DIE, James Allen (1823–76). An American soldier, born in New York City. He graduated at West Point in 1843 and during the Mexican War was the military commandant of San Francisco. During the Peninsular, Maryland, and Rappahannock campaigns of the Civil War he was acting adjutant general of the Army of the Potomac, and on Nov. 29, 1862, was commissioned brigadier general of volunteers. In 1863 he was appointed assistant adjutant general with the rank of major on the staff of the regular army, and on May 24, 1864, was made inspector general with the rank of colonel. On March 13, 1865, he was brevetted a major general in the regular army.

HARDIE, James Keir (1856–1915). An English labor leader, born in Scotland. He worked in the coal mines from the age of 7 to 24, was elected secretary of the Lanarkshire Miners' Union, and edited the Cumnock *News* (1882–86) and the *Labour Leader* (1887–1903). In 1893 he founded the Socialistic Independent Labor party. He was elected to Parliament from South West Ham in 1892, suffered defeat in 1895, was chosen from Merthyr Tydvil in 1900, and was reëlected in January, 1906. After that election (see Political Parties, *Great Britain*) he became leader of the Labor party in the House of Commons. He visited and lectured in India and Australia in 1907, in the United States in 1909, and in Canada in 1912. In 1913–14 he was chairman of the Independent Labor party. He is author of *Labour Politics: A Symposium* (1903); *From Serfdom to Socialism* (1907); *India: Impressions and Suggestions* (1909); *After Twenty Years: All about the Independent Labour Party* (1913).

HARD′ING, Chester (1792–1866). An American portrait painter. He was born in

Conway, Mass., but removed at 12 with his father to western New York, then a wilderness. He grew up a pioneer, of splendid physique, and in 1812 enlisted in the army as a drummer. He then tried various pursuits, including keeping a tavern, and finally went to Pittsburgh, where he was engaged as a house painter. At this time he took up portrait painting, and set up as a portrait painter, entirely self-taught, at Paris, Ky. After a short time spent in study at Philadelphia he spent successful seasons at St. Louis and Washington. In 1823 he established a studio in Boston, where he enjoyed great popularity. In 1832 he went to London, where he experienced the same remarkable success, and during a stay of three years he painted the portraits of many prominent Englishmen, including Rogers the poet, Alison the historian, the dukes of Sussex and Hamilton, and Lord Aberdeen. After his return his headquarters were Boston, but he practiced also in other American cities. Among his many friends was Daniel Webster, portraits of whom by Harding hang in the Bar Association, New York, and in the Cincinnati Museum. Among his principal portraits are those of Washington Allston, John Randolph (Corcoran Gallery, Washington), General Sherman, Henry Clay, John C. Calhoun, Chief Justice Marshall, Charles Carroll, and Presidents Madison, Monroe, and John Quincy Adams. They are powerfully characterized, though deficient in technique. Consult *My Egotistigraphy*, by the Artist (Cambridge, 1866); edited with additions by his daughter, M. E. White, under the title *Chester Harding: A Sketch by his own Hand* (Boston, 1890).

HARDING, här′dĭng, Karl Ludwig (1765–1834). A German astronomer, born at Lauenburg. He was educated at Göttingen, where he studied theology, and became a tutor in the family of Schröter in Lilienthal. Schröter was an enthusiastic astronomer, and soon (1800) Harding was appointed observer and inspector in his observatory. Here he discovered the third planetoid, Juno (1804). In 1805 he went to Göttingen as professor of astronomy and eight years afterward discovered, independently of Pons, the second comet of 1813. His published works include: *Atlas Novus Cœlestis* (1808–23; reëdited by Jahn, 1856), for long the most complete astronomical chart; *Kleine astronomische Ephemeriden* (ed. with Wiessen, 1830–35); and the fifteenth in the series of Sternkarten of the Berlin Academy's publications (1830).

HARDING, Stephen (?–1134). The third abbot of the celebrated monastery of Cîteaux. Of his parentage and youthful history little is known beyond the fact that he was born at Sherborne, near Dorchester, England, of a respectable family, and in early life traveled first to Scotland, then to Paris, and later to Rome. On his way back he stopped at the Benedictine monastery at Molesme, near Dijon, Burgundy, and, joining the order, received the name of Stephen. He delighted in austerities and left the monastery with 20 companions, including the abbot and prior, in order that they might start a new monastery where the Benedictine rule should be strictly observed. Cîteaux (the cisterns), 15 miles south of Dijon, a barren and marshy spot, seemed attractive to the band, and there the monastery was built. In 1110 Stephen was elected its abbot. The rigor of observance which he enforced deterred novices from entering the new order, and when Stephen became abbot the number of monks was very few; but he persevered, and was rewarded in 1113 by the accession of St. Bernard (q.v.) and 30 others, who gave such an impulse to the institute that in a short time the number of claimants for admission compelled him to found several new convents, and especially that of Clairvaux (1115), which, under the rule of St. Bernard, attained to the very highest distinction in that age. Stephen continued till his death, at Cîteaux, March 28, 1134, to direct the fortunes of the Cistercian Order. In 1119 he drew up, in conjunction with St. Bernard and other members of the brotherhood, the well-known constitutions of the order, entitled the *Charter of Charity*, which were approved by Popes Calixtus II and Eugenius III and with some modifications have continued down to modern times as the rule of the Cistercian institute. Two of Stephen's letters are preserved among the *Epistolæ Sancti Bernardi* (Epp. 45 and 49). For his life, see Dalgairns (London, 1844; new ed., 1898). See Cistercians.

HARDING, William P. G(ould) (1864–). An American banker and public official, born in Greene Co., Ala. He graduated from the University of Alabama in 1880, in 1882 was clerk and bookkeeper in a Tuscaloosa bank, between 1886 and 1896 held various positions from bookkeeper to cashier in the Berney National Bank, Birmingham, Ala., and became vice president in 1896 and president in 1902 of the First National Bank of Birmingham. In 1914 he was appointed by President Wilson a member of the new Federal Reserve Board. He held directorships in various corporations and was president of the Alabama State Bankers' Association in 1908 and of the Birmingham Chamber of Commerce in 1913.

HARDINGE (här′dĭng) **OF LAHORE,** Henry, first Viscount (1785–1856). An English field marshal and commander in chief. The third son of the Rev. H. Hardinge, rector of Stanhope, Durham, he was born at Wrotham, Kent, on March 30, 1785. After a brief education at Eton he was gazetted as ensign to the Queen's Rangers in Upper Canada before he had attained his fifteenth year. In 1806–07 he studied with success at the Wycombe Royal Military College. He obtained a brigade command in Spain before his twenty-fifth year, after which he was attached to the Portuguese army from 1809 to 1813 in the capacity of deputy quartermaster-general. He was wounded in the battle of Vimiera; he saved the day for the British at Albuera; he was wounded again at Vittoria, but was able to take part in the actions of the Pyrenees, Nive, and Nivelle. On Napoleon's return from Elba, Hardinge joined the allied armies in Belgium and was appointed by the Duke of Wellington commissioner at the Prussian headquarters. He lost his left hand at Ligny and was unable to participate in the victory of Waterloo. He entered Parliament as a member for Durham in 1820, was four times reëlected by the same constituency, and from 1832 to 1844 was a member for Launceston. In 1828 he succeeded Lord Palmerston as Secretary for War, and he held the same office again in 1841–44. He was Secretary for Ireland in 1830 and in 1834–35. From 1844 to 1847 he was Governor-General of India. When the Sikh War broke out, he hurried to the northwestern frontier of India and served as second in command under Lord Gough during the battles of Mudki, Ferozeshah, and Sobraon. After the pacification of Lahore his services were rewarded by a viscounty, the East India Company granting him a pension of £5000, and Parliament voting him an annuity of £3000 for himself and his next two successors. On the death of the Duke of Wellington in 1852, Hardinge was appointed commander in chief of the British army and filled the home command during the Crimean War. He resigned through illness a few months before his death. The 18th of October, 1855, he was advanced to the rank of field marshal. He died Sept. 24, 1856, at his seat, South Park, near Tonbridge, Kent. Consult *Viscount Hardinge and the Advance of the British Dominions into the Punjab*, by his son, Charles, second Viscount Hardinge (Oxford, 1900).

HARDINGE OF PENS′HURST, CHARLES, first BARON (1858–). A British colonial official, educated at Harrow and at Trinity College, Cambridge. Entering the diplomatic service in 1880, he became connected with the Legation at Teheran in 1882, served from 1898 to 1903 as Secretary of the British Embassy at St. Petersburg, to which, after a short interval as Assistant Undersecretary of State for Foreign Affairs, he returned to be Ambassador in 1904–06. For the next four years he was Undersecretary of State for Foreign Affairs, and in 1910 he became Viceroy of India, in the same year being created Baron. He was honored with the decorations of many continental orders and with the chain of the Victorian Order in 1912. On Dec. 22, 1912, his state viceregal entry into Delhi was disturbed by the throwing of a bomb which was intended for the Viceroy and killed an attendant. It was during Baron Hardinge's viceroyalty that King George V and Queen Mary visited India, and the famous "durbar" was held at Delhi in December, 1911.

HARD LA′BOR. A statutory penalty which may be imposed on persons convicted of felony or certain other prescribed offenses, as an addition to the penalty of imprisonment. As a form of punishment, hard labor was unknown to the common law, though a sentence to penal servitude rendered a convict liable to the performance of such labor as the prison officials saw fit to require of him. Accordingly imprisonment with hard labor, being a purely statutory penalty, can never be legally imposed as a sentence in lieu of the ordinary imprisonment, except in the cases and to the extent expressly authorized by the statutes providing for its imposition. It was introduced in England by Act of Parliament in 1830 (11 Geo. IV and 1 Wm. IV, c. 39, § 7) which provided that the crown might commute a sentence of death to imprisonment with or without hard labor. In 1891 the Penal Servitude Act (54 and 55 Vict., c. 69, § 1) empowered a court to substitute for a sentence of penal servitude a sentence of imprisonment with or without hard labor. In the United States imprisonment with hard labor is generally authorized by Federal as well as by State legislation, in most cases where the convicted criminal is subject to imprisonment in a State prison or penitentiary. The kind and amount of labor required of the sentenced criminal are regulated by statute or by prison rules. Consult: Stephen, *History of the Criminal Law of England* (London, 1883); *Encyclopædia of the Laws of England; United States Revised Statutes, 5542.* See PUNISHMENT; IMPRISONMENT.

HARD′MAN, FREDERICK (1814–74). An English novelist and journalist. He was the son of Joseph Hardman, a London merchant, but, disliking the life in a counting house for which his father intended him, went to Spain in 1834 and served against the Carlists. In 1840 he began contributing to *Blackwood's Magazine* and after 10 years of literary work became foreign correspondent of the London *Times*. Among his works are various sketches and stories reprinted from *Blackwood; Central America* (1852); and a translation of Weiss's *History of the French Protestant Refugees* (1854).

HARD′MOUTH. A fish. See CHISELMOUTH.

HARD′NESS, SCALE OF. The hardness of a solid substance may be measured by its capacity for scratching, or being scratched by, other substances. The variations in degree of hardness presented by different minerals give valuable physical indications by which one mineral may be readily distinguished from others. The hardness of a given substance is generally determined with reference to a few well-known minerals, which form a standard "scale of hardness," as follows:

1. Talc.
2. Gypsum.
3. Calcite.
4. Fluorite.
5. Apatite.
6. Feldspar.
7. Quartz.
8. Topaz.
9. Sapphire.
10. Diamond.

Talc is easily scratched by the finger nail; gypsum is not easily scratched by the finger nail; calcite has about the same hardness as coin copper; fluorite is not scratched by a copper coin and does not scratch glass; apatite scratches glass with difficulty and is easily scratched by a knife; feldspar scratches glass easily and is not easily scratched by a knife; quartz is not scratched by a knife and yields with difficulty to the file; topaz, sapphire, and diamond are all harder than flint.

As the advance of science has demanded a greater accuracy in the determination of hardness, instruments of precision, known as sclerometers, have, for scientific work, largely replaced the standard comparative scale of hardness. Sclerometers are of several types, but they consist in general of a point made of some hard substance which may, by a series of weights, be pressed against the mineral to be tested, the latter being mounted on a movable carriage. The hardness is measured either by noting the weight required to obtain a scratch, or by weighing the material removed by a given number of scratches under a fixed weight.

HARDOUIN, GASTON JOSEPH. See ANDLAU, COMTE D'.

HARDOUIN, år′dwăɴ′, JEAN (1646–1729). A French classical scholar, born at Quimper, in Brittany. He early entered the Jesuit Order, for a time lectured on rhetoric, and in 1683 became librarian in the Lycée Louis le Grand, Paris. His attainments were notable, his vagaries profound. He prepared, for the Delphin Classics, an edition (1685) of the *Historia Naturalis* of Pliny the Elder, of which Huet observed, with some exaggeration, that Hardouin had accomplished in five years a task for which five other savants together would have required 50; and, on the other hand, he solemnly adduced theories which involved him in controversy with many of the chronologists and antiquaries of his time, and disagreement with all, and provoked his superiors to demand a public recantation (1708). This curious archæologist declared that the greater part of the books commonly attributed to the ancients are in reality the work of Benedictine monks of the Middle Ages under the direction of a hypothetical Severus Archontius. He accepted as genuinely classic only Homer, Herodotus, Pliny the Elder, Cicero, the *Epistolæ* and *Saturæ* of Horace, and the *Georgics* of Vergil. In all other cases, he held, allusions to Christianity, references to historical events of the Middle Ages, or obvious allegory (as, e.g., the *Æneid*, which, in Hardouin's opinion, described the voyage of St. Paul to Rome and the proclamation of the gospel in Italy), determine a recent origin. Similarly, he urged, all coins and medals supposed to be of the antique world are the work of modern artists. He maintained also, despite all evidence, that no council of the Roman Catholic church was held previous to that of Trent. Hardouin's epitaph by Jacob Vernet, professor of theology at Geneva, well reads: "Hic jacet hominum paradoxotatos, . . . *credulitate puer, audacia juvenis, deliriis senex.*" His further publications include the titles: *Nummi Antiqui Populorum et Urbium Illustrati* (1684); *Chronologiæ ex Nummis Antiquis Restitutæ* (1696); *Prolegomena ad Censuram Veterum Scriptorum; Conciliorum Collectio Regia Maxima* (1714–15), an important work. Consult Debacker, *Bibliothèque des écrivains de la compagnie de Jésus* (2 vols., Liége, 1853–54).

HARD'PAN'. The hard stratum of earth beneath the layer of surface soil, especially noticeable in alkali soils (q.v.) and in certain acid swamp soils, forming in this case a hard ferruginous layer known in Europe as ortstein. Sometimes a hardpan is produced in arable lands by the pressing of the plow and the trampling of the team, in this case known as plow sole; but this may be prevented, or destroyed when formed, by plowing at varying depths.

"HARDS," or "HARD SHELLS." The name of a short-lived faction of the Democratic party in New York State. See BARNBURNERS; HUNKERS; PARTY NAMES.

HARD'TAIL'. The name sometimes applied to the yellow mackerel. See JUREL.

HARD TIMES. A novel by Charles Dickens, which appeared as a serial in *Household Words*, and was published in 1854.

HARDWAR, hŭr-dwär', or **HURDWAR** (*Hari dwara*, gate of Hari or Vishnu). A frontier town of the Saharanpur District, United Provinces, British India, one of the most famous spots on the Ganges (Map: India, D 3). It stands on the west bank of the river, at the mouth of a gorge where the waters emerge from the sub-Himalayas into the plains of Hindustan and at the head of the Ganges Canal (q.v.). From its position on the sacred stream it attracts immense numbers of pilgrims for the purposes of ablution. The chief feature is the Hari-ke-charan, or bathing ghat, with the adjoining temple of Gangadwara. The *charan*, or foot mark of Vishnu, imprinted on a stone let into the upper wall of the ghat, forms an object of special reverence. The orthodox pilgrim season comprises the end of March and the beginning of April. In ordinary years the attendance amounts to 100.000 to 150,000; but on the occasion of every twelfth year a feast of peculiar sanctity takes place; the visitors, from the commencement to the close of this festival, are stated to have averaged about 650,000. Commerce mingles with religion in an annual fair, which possesses considerable mercantile importance, being one of the principal horse fairs in Upper India. Commodities of all kinds, Indian and European, find a ready sale, and the trade in grain and foodstuffs of the surrounding districts is considerable. The city is of great antiquity and was originally known as Kapila, or Gupila. Hardwar is 1024 feet above the sea, in lat. 29° 57′ N. and long. 78° 14′ E. Pop., 1901, 25,597; 1911, 26,179.

HARD'WARE. A commercial term which includes an enormous variety of articles manufactured from iron, copper, brass, or bronze, and variously known as *carpenters'*, *housekeepers'*, or *builders'* hardware. It is almost impossible to classify the articles which come under the general term, including, as it does, implements and materials used by saddlers, miners, contractors, machinists, stationers, car builders, and furniture makers and dealers. Many toys and the limitless varieties of what are called "fancy" articles belong to this branch of manufacture, as indeed does almost any article not assignable to any other branch of trade. A typical hardware catalogue contains the list of a regular stock of many thousand articles and sizes and from time to time various supplements and discount sheets are issued for the use of customers. Until the latter half of the nineteenth century the United States was almost wholly dependent on England and Germany for its hardware. Such implements as were made at home were usually the work of the village blacksmith, who was an individual of the first importance in those days. The manufacture of American hardware in general began about 1850 and has increased till now the American product with its infinite variety is in many branches the standard for excellence the world over.

HARD'WICK. A village in Caledonia Co., Vt., 22 miles north-northeast of Montpelier, on the St. Johnsbury and Lake Champlain Railroad (Map: Vermont, D 3). It is one of the largest building-granite centres in the world, having more than 40 plants in the vicinity, and there are also lumber and grist mills. The village contains a public library and a hospital, and owns its water works and electric-lighting plant. Pop., 1900, 2466; 1910, 3201.

HARDWICK, CHARLES (1821–59). An English clergyman of the Established church, born at Slingsby, Yorkshire. He was educated at Cambridge, was professor of divinity, Queen's College, Birmingham, 1853, and two years later lecturer on divinity at King's College, Cambridge. Soon after being appointed Archdeacon of Ely he was killed by falling over a precipice in the Pyrenees. He ranked high as a Church historian, his chief works being: *History of the Articles of Religion* (1851); *History of the Middle Age of the Church* (1853; 6th ed., by Dr. William Stubbs, 1888); *History of the Reformation* (1856; 9th ed., by Stubbs, 1888); *Christ and Other Masters* (4 parts, 1855–59; 3d ed., by Francis Proctor, 1874).

HARD'WICKE, PHILIP YORKE, first EARL OF (1690–1764). A distinguished English judge and statesman, born at Dover. He was educated at a private school in Bethnal Green, was then apprenticed to a London solicitor, studied at the Middle Temple, and was admitted to the bar in 1715. The favor of Lord Macclesfield, together with his own talents and attractive personality, resulted in his rapid advance in the profession. In 1719 he was elected a member of Parliament for Lewes and the following year for Seaford, which he represented until he became a peer. Within a few days after his first speech, in 1720, on the supremacy of the British over the Irish Parliament, he was appointed Solicitor-General, and three months later was knighted. In 1724 he succeeded to the attorney-generalship; in 1733 was appointed Lord Chief Justice of the King's Bench and was created Baron Hardwicke of Hardwicke, and in 1737 he became Lord Chancellor of England. Among the chief events of his long and active career were his coadministration of the government during the King's absences in 1740, 1748, and 1752; the punishment of Edinburgh for the Porteous riots in 1737; the pacification of Scotland after the Jacobite rebellion of 1744, where the wisdom displayed by him in the abolition of heritable jurisdictions was somewhat counterbalanced by his injudicious proscription of the tartan; and the loss of Minorca and the trial and execution of Byng. His is one of the great names in the distinguished history of the Court of Chancery, and it is largely to him that the system of equity jurisdiction owes the systematic and logical character which it assumed during the eighteenth century. In 1754 he was created Viscount Royston and Earl of Hardwicke, and two years later he retired into private life. Consult Harris, *The Life of Lord Chancellor Hardwicke* (3 vols., London, 1847).

HARDY, är′dē′, ALEXANDRE (c.1570–c.1631). A very fertile French dramatist, born in Paris. He is thought to have written 600 plays, of which 41 were printed (1624–28). Of these the best is *Mariamne.* He was an artisan rather than an artist and first appears in 1593 as author for a strolling company of actors. In 1599 he filled a similar place in Lecomte's company at the Parisian Theatre of the Hôtel de Bourgogne. Of his life little else is known. In his dramas he emancipated the stage from the scholarly mannerisms of Jodelle (q.v.) and became the founder of popular secular tragedy in France. The scenic traditions remained, but Hardy ignored the classic unities of time and place and soon discarded the chorus. Hardy had little stylistic or poetic talent, but he had dramatic tact and the instinct of stage effects, using old material freely for tragedies, tragicomedies, and pastorals, which, in freeing the French stage from the bondage of Latin, Spanish, or Italian models, made it an attractive field for literary men. Before Hardy's death Théophile had written his *Pyramus and Thisbe,* Racan his *Shepherd Plays* (*Bergeries*), Mairet his *Sylvie,* Gambaud his *Amaranthe* (1617–25)—all for the Hôtel de Bourgogne. He lived to see the first successes of Corneille (q.v.) and the first "regular" French tragedy, Mairet's *Sophonisbe* (1639). Hardy's *Works* have been republished in five volumes (Marburg, 1884). Consult Rigal, *A. Hardy et le théâtre français* (Paris, 1889), and *Le théâtre français avant la période classique* (ib., 1901).

HAR′DY, ARTHUR SHERBURNE (1847–). An American novelist, diplomat, and writer on mathematics. He was born at Boston, graduated at the United States Military Academy at the age of 22, and served for some time in the army. He was professor of civil engineering, Iowa College, from 1871 to 1873, received the degree of Ph.D. from Amherst in the latter year, then studied abroad, and held the chairs of civil engineering (1874–78) and mathematics (1878–93) at Dartmouth. The latter position he resigned for the purpose of devoting himself to literary and diplomatic pursuits. He was United States Minister Resident and Consul General at Teheran, Persia (1897–99); Minister to Greece, Rumania, and Servia (1899–1901); Minister to Switzerland (1901–02); and in 1902–06 was Minister to Spain. His mathematical publications include the following: *Elements of Quaternions* (1881); *New Methods in Topographical Surveying* (1884); *Elements of Analytic Geometry* (1888); *Elements of Calculus* (1890); and a translation of Argand's work on Imaginaries (New York, 1881). He is better known by his fiction, which includes: *But Yet a Woman* (1883); *The Wind of Destiny* (1886); *Passe Rose* (1889); *His Daughter First* (1903); *Aurélie* (1912); *Diane and her Friends* (1914). He is also author of two poetical works, *Francesca of Rimini* (1878) and *Songs of Two* (1900), and of the *Life and Letters of Joseph Hardy Neesima* (1891).

HARDY, ARTHUR STURGIS (1837–99). A Canadian statesman. He was born at Mount Pleasant, Ontario, was educated at the grammar school of his native town and at Rockwood Academy, studied law, and was called to the bar in 1865. After a period of successful law practice he was made a Queen's counsel in 1876. He entered political life in 1873 and was returned as Liberal member for South Brant in the Ontario Legislature. In 1877 he was made Provincial Secretary and Registrar in the administration of Sir Oliver Mowat (q.v.), and in 1889 became Commissioner of Crown Lands. When Mowat became a member of the Dominion cabinet at Ottawa in 1896, Hardy succeeded him as Premier and Attorney-General of Ontario. In 1898 he was returned to power as Premier. He was an active and very efficient legislator and in his term of office introduced many reforming and simplifying measures, most of which were passed, relating to railways, courts and legal procedure, sanitation, and liquor licenses. In 1897 he was elected vice president of the British Association for the Advancement of Science.

HARDY, SIR CHARLES (c.1716–80). An English admiral. He was the son of Vice Admiral Sir Charles Hardy, entered the navy in 1730, and in 1737 was promoted to be a third lieutenant. After serving on several ships he was sent in 1744 in charge of a convoy to Newfoundland. In this he was unsuccessful and, having been blamed for the loss of part of the convoy, was court-martialed, but was acquitted. In 1745 he commanded a ship off the coast of Portugal, where he fought a severe though indecisive action with a French man-of-war. Appointed Governor of New York in 1755, and rear admiral of the blue the following year, he aided Admiral Boscawen in the siege and reduction of Louisburg in 1758. He was second in command under Hawke during the blockade of Brest, and at the battle of Quiberon Bay was made vice admiral in 1762 and admiral in 1770. The most important event in Hardy's professional life was his appointment to the command of the Channel Fleet in 1779, when an invasion by the combined French and Spanish fleets was imminent. He had only 39 ships of the line against the enemy's 66; but the allied admirals declined to attack and returned to Brest.

HARDY, EDWARD JOHN (1849–). An

Irish clergyman and author. He was born in Armagh, was educated at Trinity College, Dublin, entered the Church in 1874, and from 1878 to 1908 was an army chaplain, seeing service all over the British Empire. His first and most famous book, *How to be Happy though Married* (1884), passed through many editions and translations. Among his other books are: *Manners Makyth Man* (1885); *Faint Yet Pursuing* (1886); *The People's Life of their Queen* (1896); *The Love Affairs of Some Famous Men* (1897); *Concerning Marriage* (1901); *Pen Portraits of our Soldiers* (1902); *John Chinaman at Home* (1905); *How to be Happy though Civil* (1909); *The Unvarying East* (1912); *Still Happy though Married* (1914).

HARDY, Ernest George (1852–). An English classical scholar, born in Hampstead and educated at Exeter College, Oxford. In 1875 he became fellow of Jesus College, Oxford, of which (after several years as headmaster of Grantham School) he became tutor (1894) and then vice principal. Besides editions of texts for school use, he published a translation of Schömann's *Greek Antiquities* (1880); *Christianity and the Roman Government* (1894); *Jesus College* (1899); *Studies in Roman History* (1906); *Six Roman Laws* (1911), and *Roman Laws and Charters* (1912), translations with notes.

HARDY, Gathorne. See Cranbrook, first Earl of.

HARDY, Robert Spence (1803–68). An English Wesleyan missionary and Buddhist scholar. He was born at Preston, Lancashire, the grandson of the noted Robert Spence, printer of York and friend of John Wesley. Entering the ministry in 1825, he was immediately appointed a missionary to Ceylon; in 1862 he became superintendent of the South Ceylon Mission. He was an honorary member of the Royal Asiatic Society and is remembered as the first exhaustively to set forth Buddhism to the western world. The languages of which he was master include Latin, Greek, Hebrew, French, Portuguese, Singhalese, Pali, and Sanskrit. His most important works are: *A Manual of Buddhism in its Modern Development; Translated from Singhalese Manuscripts* (1853); *Eastern Monachism: An Account of the Origin and Laws of the Order of Mendicants, Founded by Gautama Buddha* (1860); *William Grimshawe, Incumbent of Haworth* (1860).

HARDY, Thomas (1840–). An English realistic novelist, born in Dorsetshire. At the age of 16 he was articled to an ecclesiastical architect in Dorchester. He studied for a time at King's College, London, and in 1863 received a prize from the Royal Institute of British Architects for an essay upon *Coloured Brick and Terra-Cotta Architecture.* He worked as an architect—especially in the Gothic school—under Sir A. Blomfield in London from 1862 to 1867, and though he deserted it for literature the following year, the influence of his early studies is left upon his writing. His desire for scientific precision sometimes leads him to the introduction of technical words and phrases, which mar the otherwise severe simplicity of his style. The architect is perforce the antiquary, and from the days when Hardy took professional excursions to different village churches to see if they were worth restoring, he steeped himself in the lore of his native county, which he calls Wessex.

His first publication was an article in *Chambers's Journal* (March, 1865), entitled *How I Built Myself a House,* and after an unsuccessful attempt, called *The Poor Man and the Lady,* which George Meredith advised him to reconsider, he brought forth his first novel, *Desperate Remedies* (1871), a crude and fantastic effort, but interesting as illustrative of the author's formative stage. He struck a surer note in *Under the Greenwood Tree* (1872), an idyllic love story, or, as the title-page has it, "A Rural Painting of the Dutch School." Here the lightness of touch is equaled in none of his later work. *A Pair of Blue Eyes* (1873) marked Hardy's progress in the study of the whimsicalities of womankind and their resultant tragedy; but *Far from the Madding Crowd* was the book which first gained him popular favor. While running as an anonymous serial in the *Cornhill Magazine* throughout the year 1874, it was attributed to George Eliot, not from any similarity of style, but because no other living author was considered capable of writing it. A farcical production, called *The Hand of Ethelberta: A Comedy in Chapters* (1876), illustrated by George Du Maurier, preceded *The Return of the Native* (1878), the first really great work of Hardy and one which by some is even regarded as his masterpiece. By this time he had shaken off self-consciousness; invention had given place to imagination; and he was able to create dramatic characters and situations worthy of their inimitable stage setting, Egdon Heath. His description of that wild moorland, in the opening chapters, is a fitting introduction to the stormy lives that are mingled with it; and here the author's feeling for nature is most vividly illustrated. In *The Trumpet Major* (1880) he returned to his earlier manner of the *Greenwood Tree* and the *Madding Crowd* without attaining the graceful charm of the one or the strength of the other. Hardy is supreme in his own Wessex; here he exhibits, on the one hand, a high degree of sensibility to the delights of her rural life and, on the other, the keenest sympathy with the rustic point of view. When he forsakes the types of these regions, the result is not convincing. *A Laodicean* (1881) justifies the name, in being neither cold nor hot. The ironic tale *Two on a Tower* (1882) develops a very curious and complicated situation with much skill. But he is tethered to Wessex and paints more confidently on that background in *The Romantic Adventures of a Milkmaid* (1883) and in the *Mayor of Casterbridge: The Life and Death of a Man of Character* (1886), a title which is no misnomer. Henchard, the hero, is a strongly drawn personality, to whose level the author has been climbing, through similar types of men.

The Woodlanders (1887), though flanked by *The Return of the Native* and *Tess of the D'Urbervilles* (1891), suffers from comparison with neither, expresses the same intimate kinship of man with nature, and gives like instances of true nobility engaged in the lowliest occupations. Of the *Wessex Tales* (1888), gathered from different magazines, the strongest is "The Three Strangers" (*Longman's*, March, 1883), which was dramatized under the title *The Three Wayfarers* and produced at Terry's Theatre in London (1893), 11 years after Comyns Carr's version of *Far from the Madding Crowd* had been seen in Liverpool and in the Globe Theatre, London. Another collection of short stories entitled *A Group of Noble Dames* (1891) preceded the publication of *Tess of the D'Urbervilles: A Pure Woman Faithfully Presented* (1891), through which Hardy became most widely known. Whatever may be said for or against the purity of the woman, there cannot be two opinions regarding the vividness of the presentation, although the art of *Tess* is marred at times by philosophic digressions that do not match the remainder of the literary fabric. Yet it is doubtful if any one of Hardy's stories holds the reader's interest more closely or makes a stronger appeal to his sympathies than does this tragedy of Tess. Nor is there anywhere in Hardy's writing more convincing insistence upon a logical connection and a consequent force of uncontrollable circumstance, or more relentless reiteration of the idea that man may be forced to reap where he has not sown. Whether here, and elsewhere when he writes in this vein, Hardy reveals himself a fatalist or a rigid moralist, is a question which will be answered largely in accordance with the temperament of the reader. A dramatization of *Tess*, made by Lorrimer Stoddard (1897) and taking no more than the usual liberties with the original plot, gave Mrs. Minnie Maddern Fiske (q.v.) the means for bringing out the subtle characterization of the heroine.

Whatever else may be said of *Jude the Obscure* (1895), it seems quite apparent that here Hardy gives the fullest expression to his genius for minute and merciless character analysis. There is even a feeling, at times, that the psychology is in danger of being refined into nothingness. The story of Jude's early discouragements in his efforts to get a university education is said to be autobiographical to a certain extent. The whole is a harrowing, and yet in the main convincing, study of the degradation of a character cursed from the outset with certain of the most dangerous moral weaknesses, which are steadily cultivated by cunningly conceived circumstances and plausibly arranged episodes. It can scarcely be denied that both of these books are literary masterpieces in their genre; and consideration of the remarkable fertility and resourcefulness of expression which each displays, makes the more inexplicable their author's occasional descent to the employment of indelicate metaphor and frankly indecent "realism."

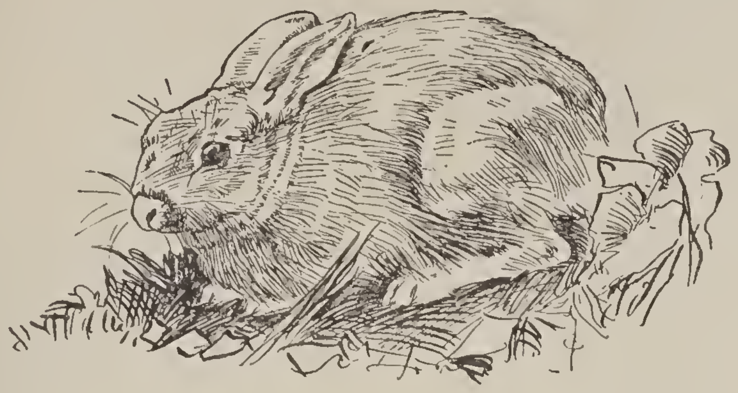
Life's Little Ironies (1894) are short stories evidencing Hardy's grim sense of humor no less than his appreciation of values. He knows and shows how few among the coveted prizes of life are worth the struggle. *The Well-Beloved*, which was serially published in 1892, and in book form, with some revision, five years later, is of less importance. The reciprocal feeling of his native county found expression in his appointment as one of its magistrates (1894). Some of Hardy's earliest efforts were in verse, and the stray poetical productions of 30 years were collected in two volumes, *Wessex Poems* (1898) and *Poems of the Past and Present* (1901). They bear his mark in the saturnine flavor of some, the sympathy with the country and country folk of others, the patriotic English sentiment of all; but the instrument is not his own. He wrote *The Dynasts* (in three parts, 1904–08), a poetical drama. A complete edition of his works was published in 1905. In 1909 appeared *Time's Laughingstocks and other Verses*, and in 1913, after a long interval in his fiction writing, *A Changed Man, and Other Tales*. *The Works of Thomas Hardy in Prose and Verse, with Prefaces and Notes* (20 vols.) was published in 1912–13. In 1910 Hardy was given the Order of Merit. Consult: W. Sherren, *The Wessex of Romance* (New York, 1902); Windle, *The Wessex of Thomas Hardy* (ib., 1901); Macdonell, *Thomas Hardy* (London, 1894); Lionel Johnson, *The Art of Thomas Hardy* (ib., 1894); Harper, *The Hardy Country* (New York, 1904); *Wessex*, painted by Walter Tyndale and described by Clive Holland (ib., 1906); F. O. Saxelby, *The Thomas Hardy Dictionary* (ib., 1911); L. Abercrombie, *Thomas Hardy: A Critical Study* (ib., 1913); H. Lea, *Thomas Hardy's Wessex* (ib., 1913).

HARDY, Sir Thomas Duffus (1804–78). An English archivist, born at Port Royal, Jamaica. He succeeded Petrie as editor of the *Monumenta Historica*, published in 1848. As deputy keeper of the new Record Office, he did much to make all records accessible to the public, and brought to London the muniments of the three palatinates. He edited many documents for the Rolls Series. Representative of his work are: *A Descriptive Catalogue of MSS. Relating to the History of Great Britain and Ireland* (1862–71); *Registrum Palatinum Dunelmense* (1873–78); *Catalogue of the Lords Chancellors, etc.* (1843).

HAR'DYNG, John (1378–?1465). An English chronicler. He was page to Sir Henry Percy, whom Shakespeare has immortalized as "Harry Hotspur," and went to the wars with his master. His rhyming chronicle, a curious but entirely unreliable document, evidences the ranges of his historical reading and his adaptability in treating current events in a manner pleasing to his patrons. Ellis's modern edition of this *Chronicle of England unto the Reign of King Edward V* was published in 1812. Grafton printed versions of it in 1543.

HARE (AS. *hara*, Icel. *hēri*, OHG. *haso*, Ger. *Hase*, hare; connected with OPruss. *sasnis*, OIr. *ceinach*, Skt. *śvaśura*, for **svaśura*, hare). One of a genus of rodent quadrupeds, of which there are many species very similar to each other. The Linnæan genus *Lepus* now forms the family Leporidæ, of which a peculiar characteristic is the presence of two small incisors immediately behind the ordinary rodent incisors of the upper jaw, so that these teeth seem to be double. This peculiarity is also found in the pikas (q.v.). The molar teeth, six on each side above and five below, are transversely grooved, and are formed of two vertical plates soldered together. All the animals of this family feed exclusively on vegetable food and chiefly on herbage, although they are also fond of grain, roots, and the bark of trees. Their forefeet have five toes, their hind feet four; the soles are hairy. Their fur is soft; the colors mostly gray or brown. The Alpine and Arctic species become white in winter; and all, except one Indian species, have white upon the undersurface of the tail. As this is invariably upturned in flight, it is regarded by naturalists as a recognition mark by which the young or companions may keep in view and follow their flying leader. From this characteristic arises the name "cottontail," popularly given to one of the smaller American hares. The black markings which become so conspicuous upon the ears of several species when they are lifted serve a similar purpose, and all disappear when the animal squats, and it then pre-

HARES AND PIKA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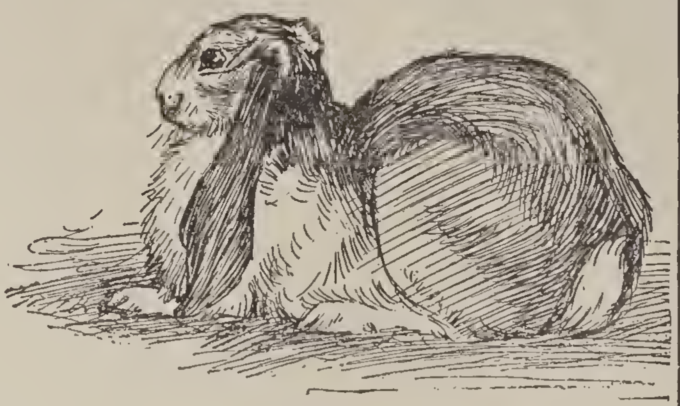
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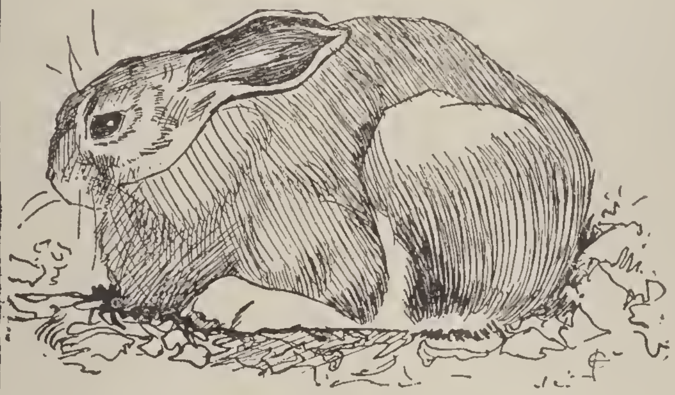
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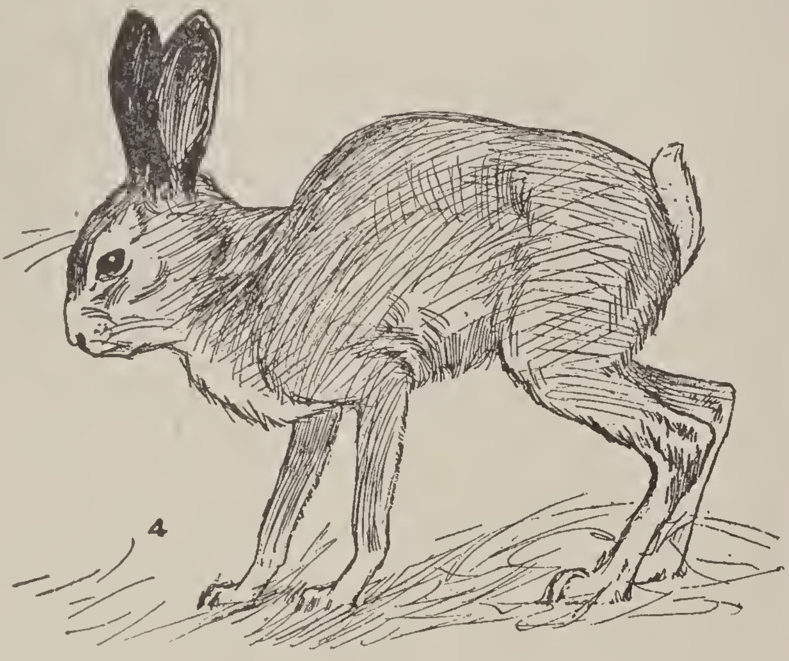
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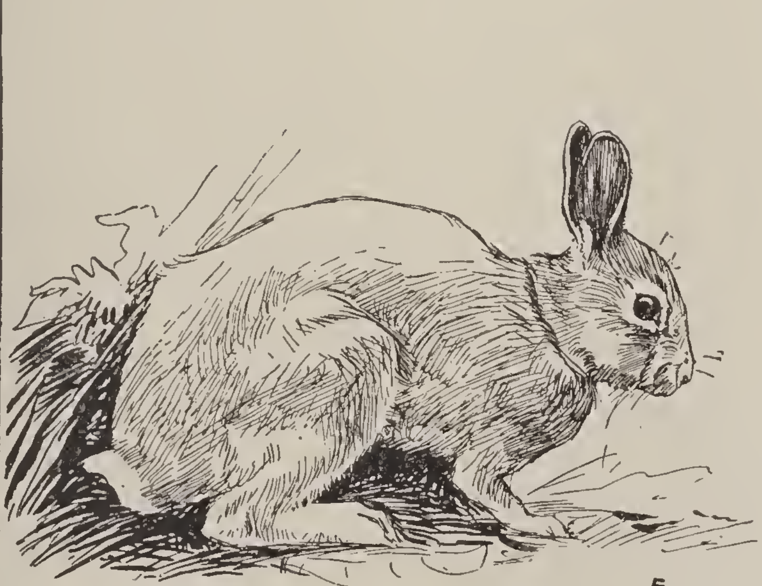
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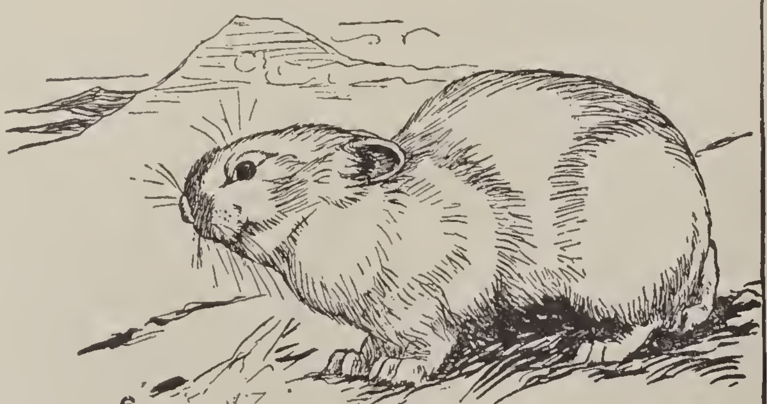
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1. COMMON EUROPEAN RABBIT (Oryctolagus cuniculus).
2. LOP-EARED RABBIT (domestic variety).
3. VARYING HARE (Lepus americanus).
4. BLACK-EARED JACK-RABBIT (Lepus melanotis).
5. COTTON-TAIL (Lepus sylvaticus).
6. ROCKY MOUNTAIN PIKA (Ochotona princeps).

sents to the eye of the searcher only a neutral-tinted back. Hares thus offer good illustrations of "protective coloration" and "recognition marks" (qq.v). The rabbit also belongs to this family, but it is so different in many ways that it is described by itself. It may be said, in passing, that although the term "rabbit" is used generally for all kinds of leporine animals in North America, where the true rabbit does not exist, it belongs exclusively to the burrowing *Lepus cuniculus* of Europe; and all others of the family, including all the American species, should be called hares. About 30 species of *Lepus* are known, of which one is found in South America and some 20 in North America.

Hares of the Old World. The type of the family is the common hare (*Lepus europæus*), which is found all over Europe, except in Ireland, Scandinavia, and the north of Russia. Its length is from 20 to 22 inches, and its usual weight seven or eight pounds. Another familiar Old World species is the mountain, or Alpine, hare (*Lepus timidus*). This occurs in Ireland, all over northern Europe and Asia, and in the Pyrenees, Alps, Caucasus, and thence east to Japan; while the polar hare of America is regarded by some naturalists as identical with it. It is considerably smaller than the common hare and has a rounder head, with shorter ears, hind legs, and tail, and a lighter-colored coat, which, at least in the colder parts of its range, turns white in winter. In Central Asia are found several other species, some of which are confined to the higher slopes of the great mountain ranges. A remarkable species is the Indian, or hispid, hare (*Lepus hispidus*), of the foothills of the eastern Himalayas. This hare has coarse, bristly ears, which are shorter than the skull, small eyes, a tail which is dark below and above, and hind legs only a little longer than the front ones. It is not a gregarious animal, but it is said to burrow as a rabbit does, and its young, therefore, are probably born naked and blind. It is reported that its flesh is white. Sumatra has an allied species. In Africa several species of hares inhabit the more open parts of the continent from the Sahara to the Cape. The habits of all these (except the hispid) are much alike.

The members of this family live among rocks and bushes, or in open country among the grass and brush. Each has a "form" in the grass or sheltered by a rock, and sometimes returns to this form every day for much of the year. Hares feed at night, are mainly nocturnal in their movements, and do not return to their forms until sunrise. Because of the greater proportionate length of their hind legs, they run up hill more easily than down, and they develop great speed. All the members of the genus are remarkable for their extreme timidity, yet they are often bold and courageous in defense of their young, and pugnacious towards others of their own race. Their angry stamping upon the ground with the hind feet is well known to all countrymen. With these hind feet they can deliver powerful blows, and this is their method in fighting. The hare never becomes fat, but its flesh is excellent food. Though shot and trapped, the ordinary method of hunting it, as a sport, is by coursing with greyhounds—a sport of classic antiquity. (See COURSING.) It is a prolific animal, although not nearly so much so as the rabbit. The female produces from two to five at a birth, and may begin to breed at six months of age and produce two or three broods a year. The young (*leverets*) are born covered with hair and with the eyes open. When, as in the case of the hares of California, their natural enemies—beasts and birds of prey and serpents—are greatly reduced, this multiplication goes on with little to check it, while, if the food supply is yearly added to by enlarging plantations, the increase may be so rapid that the animals become a serious menace to agriculture, and special efforts must be made to keep them down.

American Hares. The Canadian polar hare is a variety (*arcticus*) of the European northern hare and turns from its brownish grizzle in summer to pure white in winter. It comes little south of the Arctic circle, except on the east coast, where it is to be found in Labrador and Newfoundland. Other American hares turn white in winter, however. The most conspicuous of these is the "varying" hare (*Lepus americanus*), which is distributed from the middle parts of the United States throughout the northern parts of the continent wherever forests grow. It shows a great variety of reddish and brownish tints, always with the tips of the ears black behind, and in winter among northern specimens only these black ear tips relieve the snowy white of the pelage; but southern specimens often make only a partial change of coat. On the Western plain and in California are found several species of large hares of gaunt form and immense ears, naturally called "jack rabbits" ("liebres" by the Mexicans). A dozen species or subspecies are recognized. (Consult E. T. Seton, *Life-Histories of Northern Animals*, New York, 1909.) The white-tailed or prairie hare (*Lepus campestris*) is found all over the plains north of Kansas and throughout the Utah Basin. It is the only jack rabbit whose coat turns white in winter, and it may be recognized in summer by the fact that its tail is entirely white. The tails of the other jack rabbits are more or less black on the top—a fact easily seen, as none of this group of hares turns up its tail as do the wood hares. Among the Western black-tailed rabbits are: (1) a buff-bellied species found in California and southwestern Oregon (*Lepus californicus*); (2) a large, long-limbed species inhabiting southern Arizona and Sonora, known as Allen's hare (*Lepus alleni*); (3) a widely distributed white-bellied animal with long ears, occurring in the Great Basin and commonly known as the Texan jack rabbit (*Lepus texanus*); and (4) the tall black-eared jack of the Great Plains (*Lepus melanotis*). It is doubtful whether any real distinction exists between the two last named, and the jack rabbit of the Southern plains may be said to extend westwardly to the Pacific coast.

These hares of the plains do not burrow, nor seek the protection of holes or shelter of any kind, beyond that afforded by a thicket of brush which may shield them from the winter's wind or the equally dreaded rays of the midsummer sun. Some dwell in a region where the winter temperature may fall as low as 50° F. below zero; others where the noonday sun heats the air to 140° and makes the rocks unbearable to touch; some in rich valleys, others on the sourest of deserts; yet all thrive with that remarkable adaptability to varying conditions which must be reckoned with in any consideration of these animals as a pest. Their food consists of grass, herbage, and largely of bark. It is difficult to find any considerable extent of country which does not supply enough of this fodder for a population of hares, and as they drink but little, they do not suffer from the lack of water even in an almost desert land, for the moisture in the ordinary desert herbage seems to be all they require. They have comparatively few enemies, against which they are guarded by their invisibility when crouched in their "forms"; by their sense of sight and smell; and by the remarkable acuteness of their hearing, for the augmentation of which the great ears have been developed. If danger comes too near, they can usually escape it by flight—a word that approaches literal accuracy as a description of the series of high bounds, each 15 to 20 feet in length, with which their great hind legs carry them over the ground.

They multiply rapidly, yet are not so fecund as is frequently alleged. Those in the arid Southwest seem to produce only one to three at a birth, but have several broods a year, between January and September; while the Northern species breed no more than twice, as a rule, with four to six young in a litter. Most births fall in April, May, and June. The period of gestation is about 30 days. The young are born fully furred, with their eyes open, and often with several teeth in sight. They attain their full size (but not weight) in about two months. It will be seen that at this rate of increase, under such favorable conditions as are brought about in the West by irrigation, agriculture, and the diminution of serpents and birds and beasts of prey, the danger from an overpopulation of hares is very great; and for many years this has been a serious pest. Large sums have been spent on "rabbit-proof" fences and on various devices for excluding the animals from fields and orchards; and still larger losses have occurred through the absence or failure of protection. The principal measure has been that of the periodical "drive." All the men and boys and many women and girls of a given district gather in a circle about a square mile or more of space and drive the hares into an inclosure, where they are slaughtered with clubs. These battues have been most numerous, systematic, and effective in southern California, though occasional wherever the necessity arises, and in the San Joaquin valley have so reduced the hares that they are no longer dangerous. Students of the problem have concluded, however, that "driving" is only a partial and a demoralizing remedy, and assert that the only true safety for crops and orchards lies in the rabbit-proof fence. A complete discussion of this matter, with its history, statistics, and teachings, together with much information as to the utilization of the American hares as food and for their skins, hair, etc., may be found in Palmer, *The Jack-Rabbits of the United States* (Department of Agriculture, Washington, 1896), and Beddard, *Mammalia* (London, 1902).

Wood Hares. Of the smaller hares, the wood hare, or cottontail (*Lepus sylvaticus*), is the "common rabbit" of the United States, where it is scattered from the Atlantic to the Pacific, but does not extend far north. It is about 18 inches long; gray, more or less varied with black above, and somewhat tinged with yellowish brown, white below; tail cottony white; ears two-thirds the length of the head. The little marsh hare (*Lepus palustris*), whose tail is not grayish nor cottony, and the water hare, or "swamp rabbit," are familiar Southern species, the latter large and yellowish brown, white below.

Bibliography. Audubon and Bachman, *Quadrupeds of North America* (New York, 1856); Stone and Cram, *American Animals* (ib., 1902); Sharp, *Wild Life Near Home* (ib., 1901); E. T. Seton, *Wild Animals I Have Known* (ib., 1898); H. A. Bryden, *Hare Hunting and Harriers* (London, 1903); M. W. Lyon, *Classification of the Hares and their Allies* (Washington, 1904); J. C. Tregarthen, *Story of a Hare* (London, 1912). See RABBIT; PIKA; and Plate of HARES AND PIKA.

HARE. In point of law, one of the wild animals called game which are specially protected by game laws. The close season for hares is regulated in the United States by State legislation. See GAME LAWS.

HARE, AUGUSTUS JOHN CUTHBERT (1834–1903). An English author, the nephew of Julius and Augustus Hare. He was born in Rome and educated at Harrow and at University College, Oxford. The results of his travels he has given in guidebooks of great value to the traveler. Among his works, which are not limited to the *vademecums* referred to above, are: *Walks in Rome* (1870); *Cities of Northern and Central Italy* (1875); *Walks in London* (1877); *Cities of Southern Italy and Sicily* (1882). His *Story of my Life* (6 vols., 1896–1900) is full of delightful reminiscences of many celebrated people, and his *Memorials of a Quiet Life* (1872–76) is a charming biographical account of certain of his relatives. To him we are also indebted for a life of Maria Edgeworth (1894).

HARE, AUGUSTUS WILLIAM (1792–1834). An English clergyman of the Established church; brother of Julius Charles Hare. He was born in Rome and was educated at Winchester and at New College, Oxford, where he attacked several ancient customs and became founder of the Attic Society. He had been adopted (1798) by the widow of Sir William Jones, his godfather, but broke with her because of his refusal to qualify for the valuable living of Hurstmonceaux, formerly held by his father and in the gift of the Jones family. He became a tutor at New College in 1818 and, after ordination in 1825, rector of Alton-Barnes, where he lived from 1829 until poor health drove him to Rome. He wrote *Sermons to a Country Congregation* (1837) and, with his brother, *Guesses at Truth* (1827). Consult A. J. C. Hare, *Memorials of a Quiet Life* (London, 1872–76).

HARE, GEORGE EMLEN (1808–92). An American Protestant Episcopal clergyman, born in Philadelphia. He graduated at Union College in 1826, was rector of St. John's, Carlisle, Pa. (1830–34), of Trinity Church, Princeton, N. J. (1834–43), and of St. Matthew's, Philadelphia (1845–52). In 1844–45 he was professor of Latin and Greek at the University of Pennsylvania. He had had charge of the Episcopal Academy during a part of his pastorate at St. Matthew's and was made instructor in the diocesan training school and, after its development into the Philadelphia Divinity School, a professor of biblical learning, and then (1881) of New Testament literature in the latter institution. He wrote *Christ to Return* (1840) and a volume of sermons, *Visions and Narratives of the Old Testament* (1889).

HARE, HOBART AMORY (1862–). An American physician, born in Philadelphia. He received the degree of M.D. in 1884 from the medical department of the University of Pennsylvania, where he was professor of children's diseases in 1890, and in 1893 from Jefferson Medical College, where he became professor of therapeutics and diagnosis in 1891. He edited various medical journals—the *Therapeutic Gazette* after 1891. His medical essays won him many prizes from universities and medical societies. He is editor of *A System of Therapeutics* (4 vols., 1890–97; 14th ed., 1912) and *Medical Complications and Sequels of Typhoid and Other Fevers* (1901; 2d ed., 1909), and is author of *Essentials of Physiology* (1889; 4th ed., rev., 1897); *A Text-Book of Practical Therapeutics* (1890; 13th ed., 1909); *Practical Diagnosis* (1896; 6th ed., 1906); *A Text-Book of the Practice of Medicine* (1905); *Diagnosis in the Office and at the Bedside* (1914).

HARE, Sir John (1844–). A well-known English actor and manager. He was born in London, was educated in Yorkshire, and made his first stage appearance at the Prince of Wales Theatre, Liverpool. Soon afterward (1865) he came to the London theatre of the same name, where he was very popular in the comedies of T. W. Robertson, with some of which in later years he toured in America. In 1875 he became manager of the Court Theatre, where he brought out *Olivia*, *A Scrap of Paper*, and other pieces. With Mr. Kendal at the St. James's Theatre (1879–88) he produced *Still Waters Run Deep* and *The Ironmaster.* In 1889 he assumed the management of the Garrick Theatre and afterward appeared with several of A. W. Pinero's plays, notably *The Profligate, The Notorious Mrs. Ebbsmith*, and *Lady Bountiful.* He took the Globe Theatre in 1897, producing *A Bachelor's Romance* there, and in 1899 Pinero's *The Gay Lord Quex*, which he brought to America in the season of 1900–01. He was knighted in 1907. Consult: Pemberton, *John Hare, Comedian* (London, 1895); Scott, *The Drama of Yesterday and To-day* (ib., 1899); William Winter, *The Wallet of Time* (2 vols., New York, 1913).

HARE, John Innes Clark (1817–1905). An American jurist, born in Philadelphia. He graduated at the University of Pennsylvania in 1834, was admitted to the bar in 1841, was associate judge of the Philadelphia district court (1851–67), then its presiding judge (1867–75), and from 1875 to 1895 was presiding judge of the Court of Common Pleas in the same city. In 1868 he received the degree of doctor of laws at the end of 10 years' service as a trustee of the University of Pennsylvania, in which he served for many years as professor of the institutes of law. His principle works are: *American Leading Cases*, with Horace B. Wallis (1847); *The Law of Contracts* (1887); *American Constitutional Law* (2 vols., 1889); *Smith's Leading Cases in Law* (1852); *White and Tudor's Leading Cases in Equity* (1852); *Hare on Contracts* (1887); *The New English Exchequer Reports.*

HARE, Julius Charles (1795–1855). Archdeacon of Lewes, a well-known English writer. He was born at Valdagno, 50 miles northwest of Venice, Italy, Sept. 13, 1795. While still a boy, he passed a winter at Weimar (1804–05), where he met Goethe and Schiller, and gained a permanent interest in German literature. On the death of his mother, in 1806, he was sent to the Charterhouse in London, where he remained until 1812, when he entered Trinity, Cambridge. There he became fellow in 1818, and after traveling abroad be began to read law in London in 1819. In 1822 he was appointed assistant tutor at Trinity College, which position he retained for 10 years. He was ordained in 1826. In 1827 appeared the *Guesses at Truth by Two Brothers*, written by Hare and his eldest brother, Augustus William (q.v.). On the death of his uncle, in 1832, the rich family living of Hurstmonceaux, in Sussex, was refused by his brother Augustus and fell to him. After a journey to the Continent, where he met Bunsen at Rome, he came to his parish. With good intentions, he was not adaptable to the work of a country priest. In 1840 Hare was appointed Archdeacon of Lewes and in the same year preached a course of sermons at Cambridge, *The Victory of Faith* (3d ed., by Plumptre, 1874), followed in 1846 by a second, *The Mission of the Comforter* (3d ed., 1876). In 1853 he became a queen's chaplain. He was never successful as a preacher, but he was a scholar and a conscientious worker and did much to introduce England to German criticism and theology. He died at Hurstmonceaux, Jan. 23, 1855. For his biography, consult A. J. C. Hare, *Memorials of a Quiet Life* (London, 1872–76).

HARE, Robert (1781–1858). An American chemist, born in Philadelphia. As a boy he was employed in his father's brewery and had little spare time for study, but he managed to accumulate considerable knowledge of chemistry and physics and in 1801 invented the oxyhydrogen blowpipe. For this the American Academy of Arts and Sciences awarded him the Rumford medal. In 1818 he was professor of chemistry at William and Mary College, and until 1847 at the University of Pennsylvania. He made many ingenious and practical inventions of laboratory apparatus and wrote a number of papers on scientific subjects, in addition to which he published *Brief View of the Policy and Resources of the United States* (1810) and *Chemical Apparatus and Manipulations* (1836). His collection of chemical and physical apparatus is preserved by the Smithsonian Institution, of which he was an honorary member.

HARE, William Hobart (1838–1909). An American bishop of the Protestant Episcopal church, son of George Emlen Hare. He was born at Princeton, N. J., and was educated at the University of Pennsylvania. He preached in Philadelphia until 1870, was for three years the general agent of the foreign committee of the board of missions, and in 1872 was elected Missionary Bishop of Niobrara. In 1883 his diocese was extended to include the State of South Dakota. He wrote several pamphlets on missionary work in the West. Consult M. A. D. Howe, *The Life and Labors of Bishop Hare, Apostle to the Sioux* (New York, 1911).

HARE KANGAROO. One of the small banded wallabies (q.v.) of the genus *Lagostrophus*, which resemble hares and have habits singularly like that animal's. They inhabit swampy districts on the west coast of Australia and make refuges for themselves by forming tunnels through the dense scrub, biting away twigs and branches until a clear passage and chamber are formed.

HAREL, å'rĕl', Paul (1854–). A French poet and innkeeper, born at Echauffour. He succeeded his grandfather as host of the inn *A la Croix Saint-André*, early showed himself master of a simple and beautiful lyric style, was elected a member of the Academy of Caen, and in 1887 received a prize from the French

Academy. He published: *Sous les pommiers* (1879); *Gousses d'ail, et Fleurs de serpolet* (1881); *Les vingthuit jours du caporal Ballandard* (1882), with Le Vavasseur; *Rimes de broche et d'épée* (1883); *Aux champs* (1886); *La hauterie* (1889); the less successful play, *L'Herbager* (1891); *Voix de la glèbe* (1895); *Les dyspeptiques: fantaisie normande* (1908), which was well received.

HARE'LIP'. A deformity of the lip, frequently involving also the roof of the mouth, consisting of a cleft through these structures, to one side of the median line or on each side of it. Median fissure occurs at times, but is very unusual. It exists at birth, and the lip should be repaired during early infancy by operation. The cleft palate should be left till a later date, but should be closed before the child begins to talk. The cleft in the palate may be closed by an obturator in adults. In the ordinary (single cleft) form the mouth of the babe resembles that of a cat or hare. The double-cleft palate is comparatively rare. See DEGENERACY.

HARELIP. See CUTLIPS.

HA'REM (Ar. *ḥarim*, that which is sacred, set apart, forbidden). The name given in Mohammedan countries to the apartment in a dwelling set aside for the female members of the household. The Koran enjoins that women shall be discreet in their association with the other sex and forbids them to expose face or person except to a husband, father, son, or certain intimate male relatives (Sura xxiv. 31; xxxiii. 53–55). But such injunctions are not peculiar to Islam, and the extraordinary precautions observed by Mohammedans with respect to their women represent a deeply rooted Oriental idea much older than the rise of Islam. The setting aside of a special apartment for women in a house is but one of these precautions and undoubtedly antedates the time of Mohammed. The excavations conducted at Susa by Dieulafoy and De Morgan indicate that the palaces of the Persian kings contained a separate wing for the women—a view which is in accord with certain allusions in the Book of Esther (v. 12; vii. 1). In other books of the Old Testament there are also references to a special woman's apartment, and, from the fact that in Babylonian *kharimtu* is one of the names for woman, we may conclude that already in ancient Babylonia the women were kept in a greater or lesser degree of seclusion. It is, however, due to the influence of Islam that the harem as an institution has been so rigidly maintained in the East. It is at the risk of life that a nonbeliever or a male Mohammedan who does not fall within the prescribed category of husband, father, son, or other intimate relative enters the harem of a Mohammedan householder, to which there is always a separate entrance. While within the household the social intercourse between husband and wife is quite free, the wife or the wives of a man, attended by servants, mostly females, lead to a large extent isolated lives. The women visit one another and spend most of their time in each other's apartments. Restrictions of various kinds are imposed on them when they leave these apartments. They are to be veiled when appearing in the street, are accompanied by a male servant, and it is equivalent to loss of caste for a woman to be seen in company with a man unless veiled and in the presence of her husband. The harem as an institution is not necessarily connected with polygamy, for although a Mohammedan has by the law of the Koran the right to take four wives, there are comparatively few householders who avail themselves of this rather costly privilege. One wife or a wife and a concubine form the rule, and it is mostly in the case of persons occupying a high official position that several wives are gathered together under one roof. By an unwritten law the Sultan has the right to seven wives and an indefinite number of concubines, but it should be added that the tales of an extensive harem maintained by the rulers of Turkey are largely exaggerated and rest upon a confusion between actual wives (or concubines) and female attendants and slaves, of which there are of course large numbers in a royal household. The harem customs and the treatment accorded the women vary considerably in the various Mohammedan countries—Egypt, Syria, Arabia, Persia, Turkey, and India. In general more liberties appear to be allowed the women of the harem in Turkey and India than elsewhere; but it must be remembered that, even where the women are under the strictest surveillance, long-standing custom has deprived the technical imprisonment of any sense of degradation; and from the Mohammedan point of view it is not for the purpose of humiliating women that the harem as an institution has been introduced. Care is exercised to preserve the position of the "chief" wife, who takes rank above the others. In case a man has several wives, the latter may exact of their husband that each be provided with a separate apartment, consisting of at least a bedchamber and a kitchen. Within the harem, however, the woman reigns supreme; there she entertains her female friends, and there, surrounded by attendants to look after her wants, she spends her days with her children. The most objectionable features of the harem from the sociological and moral point of view are the idleness and vacuity of the life there, and the time-honored employment in large and particularly in royal households of eunuchs as supervisors of the harem and as attendants. Most of the tales of cruelty, immorality, intrigue, and crime to be found in works descriptive of harem life in the past may be traced to these features. Consult: Lane, *Manners and Customs of the Modern Egyptians* (London, 1837); Emmeline Lott, *Harem Life in Egypt and Constantinople* (ib., 1869); Harvey, *Turkish Harems and Circassian Homes* (ib., 1871); Jessup, *Women of the Arabs* (New York, 1873); Ramsay, *Everyday Life in Turkey* (London, 1897); Pierre Loti, *Les désenchantées* (Paris, 1906); Van Sommer and Zwener, *Our Moslem Sisters* (New York, 1907); id., *Daylight in the Harem* (Chicago, 1911); D. V. Brown, *Haremlik: Some Pages from the Life of Turkish Women* (Boston, 1909). Lady Mary Wortley Montagu's letters may be consulted for descriptions of harem life in the Sultan's household in the eighteenth century, but the picture is only in a measure applicable to present conditions.

HAREN, hä'ren, WILLEM VAN (1710–68). A Dutch poet, born at Leeuwarden. He studied there, at Franeker under Hemsterhuys and Heineccius, and at Groningen in the home of Jean Barbeyrac. In 1728 he succeeded to the castle of Henkenshage, at St. Anna Parish, after the death of his grandfather. The castle was burned four years later, with many valuable papers. It was rebuilt in 1734; but the fire seemed the beginning of misfortune for him, and in 1768 he committed suicide, discouraged by financial losses. He wrote: *Leonidas* (1742), an ode, urging Holland to join in the War of the Austrian Succession; *Lierganzen* (1742), which, with *Leonidas*, was republished in 1824; and an epos, *Friso* (1742 and 1758). His brother, Onno Zwier (1713–79), was a patriot and poet too. He wrote the epic *De Geuzen* (1772) and several dramas, of which *Agon* (1769) is the best. The collected works of the two brothers were published by De Vries in 1824. Consult Van Vloten, *Leven en Werken van Willem en Onno Zwier van Haren* (Deventer, 1872–74).

HARE'S-EAR MUSTARD. See Erysimum.

HARFLEUR, är'flẽr' (called in the Middle Ages *Hareflot*). A town in the Department of Seine-Inférieure, France, near the mouth of the Lézarde, about 4 miles east of Havre (Map: France, N., F 3). When the river became choked up, the Lancarville Canal was opened in 1887; it has a depth of 18 feet. The chief building is the beautiful Gothic church of St. Martin, with an elegant tower supposed to have been constructed by Henry V of England. Pop., 1901, 2686; 1911, 3320. In former times, before the rise of Havre, Harfleur was a flourishing town and the key to the entrance of the Seine. It was taken by the English under Henry V in 1415, retaken by the French in 1433, again seized by the English in 1440, and 10 years later recaptured by Charles VII of France.

HAR'FORD, John Scandrett (1785–1866). An English biographer, born in Bristol, of Quaker parents. He was educated at Cambridge, but received an honorary degree from Oxford in 1822. He gave financial aid in the restoration of the Llandaff and St. David's cathedrals, while he and his brother gave the ground for the erection of St. David's College, Lampeter, Wales. The friend of Wilberforce and Hannah More, who immortalized him as *Cœlebs in Search of a Wife*, Harford was a philanthropist, but an anti-Socialist, less of a hero than a hero worshiper, and wrote such excellent biographies as *R. V. Pryor* (1808); *T. Paine* (1820); *T. Burgess, Bishop of Salisbury* (1840); and *Recollections of W. Wilberforce* (1864). Perhaps his most important work is contained in the *Memoirs of Michael Angelo, Savonarola, Raphael, and Victoria Colonna* (2 vols., 1857).

HAR'GOOD, Sir William (1762–1839). An English admiral. His first voyage began when he was 13 years old, at which time he went to Newfoundland on the *Romney*. After service on other vessels, including the *Hebe*, on board which he had Prince William Henry, afterward William IV, for a shipmate, Hargood was made commander of the *Swallow* in 1789. Three years later he was captain of a frigate taken by the French and was court-martialed for surrendering too easily, but was honorably acquitted. His next experience was with mutineers on the *Leopard* in 1797, and the following five years he spent in Chinese and East Indian waters. In 1804–05 he was acting under Lord Nelson and was present at Trafalgar, when his ship, the *Belleisle*, and her crew suffered severely, as she was one of the first in action. Hargood's further services in North America, the West Indies, the Mediterranean, the Adriatic, and elsewhere were rewarded by his appointment to the command of the Channel squadron, with the rank of admiral (1831), and subsequently to the chief command at Plymouth (1833–36). Consult Joseph Allen, *Memoir of the Life and Services of Admiral Sir William Hargood* (Greenwich, 1841).

HARGRAVES, här'grâvz, Edmund Hammond (1815–91). The discoverer of the gold fields of Australia, born at Gosport, England. He was engaged in sheep farming at Sydney, Australia, from 1834 to 1849 and spent the years 1849–50 in California. From the similarity in geological structure of the California gold-bearing districts to the west side of the Blue Mountains, in New South Wales, he concluded that there might be gold deposits in the latter place also. Accordingly he returned to Australia in 1851, was instrumental in the discovery of the Australian gold fields in February of that year, and made an announcement regarding them to the Colonial Secretary at Sydney. He acted for a time as a commissioner for gold fields and was voted at different times, by the New South Wales and Victorian governments, £15,000, and in 1877 the former state granted him a pension of £250 a year. He published *Australia and its Gold Fields: A Historical Sketch of the Progress of the Australian Colonies . . . with a Particular Account of the Recent Gold Discoveries* (1855).

HARGREAVES, här'grēvz, James (?–1778). Inventor of the carding machine and the spinning jenny. He was an artisan at Stanhill in Lancashire, where probably he was born. Hargreaves was an illiterate man and supported himself and family by weaving and spinning, which, according to the custom of the time, he carried on in his own house. In 1760 he invented the carding machine as a substitute for the use of hand cards, and four years later he produced the spinning jenny. Hargreaves had frequently tried to spin with two or three spindles at once, holding the several threads between the fingers of his left hand; but the horizontal position of the spindles frustrated his attempt. One of his children, however, is said to have upset the spinning wheel while he was at work, and, as he retained the thread in his hand, the wheel continued revolving horizontally and the spindle vertically. The observation of these motions produced the thought that, if a number of these spindles were placed upright and side by side, many threads could be spun at once. Hargreaves now put his idea into practice and constructed the jenny, at which he and his family worked. A few of these machines were sold and served to increase eight times the work of the spinner. This success led his fellow spinners, who were imbued with strong prejudices against machinery, to break into his house and destroy his frame. He then removed to Nottingham in 1768, where he erected a spinning mill. Two years later he took out a patent for his machine, and, discovering that it was in use by manufacturers in Lancashire without his permission, brought an action for £7000 damages. Pending the trial, he was offered by a company £3000 for the use of the jenny, but refused; and it having been proved that he sold some of his machines before the patent was obtained, it was thereby declared to have been invalidated, and his claim for compensation fell to the ground. Hargreaves continued to carry on business as a yarn manufacturer, with moderate success, till his death in April, 1778.

HAR'GROVE, Robert Kennon (1829–1905).

An American bishop of the Methodist Episcopal Church South. He was born in Pickens Co., Ala., graduated at the State University in 1852, and was professor of mathematics there from 1853 to 1857. Much of his life was spent in the pastorate. From 1865 to 1867, however, he was president of the Centenary Institute and from 1869 to 1873 president of Tennessee Female College, Franklin, Tenn. In 1882, though not a member of the General Conference, he was elected Bishop. In 1889 he was elected president of the board of trustees of Vanderbilt University.

HARICOT. See Kidney Bean.

HARI-KARI, hä′rē-kä′rē. See Hara-Kiri.

HÄRING, hâ′rĭng, Wilhelm. A German novelist. See Alexis, Willibald.

HAR′INGTON, Sir John (1561–1612). An English author, born at Kelston, near Bath, in 1561. He was son of John Harington, author of the graceful *Verses on Isabella Markham.* Queen Elizabeth was his godmother. Educated at Eton and at Christ's College, Cambridge, he studied law at Lincoln's Inn, but he soon became attached to the court. At the command of Elizabeth he translated Ariosto's *Orlando Furioso* (1591). For this easy and free rendering of an Italian classic Harington is best known. In 1596 he lost for a time the favor of the Queen by a series of tracts in the outspoken manner of Rabelais: *Metamorphosis of Ajax* (i.e., "a jakes"), *Ulysses upon Ajax, An Anatomy of Ajax,* and *An Apology.* He served in Ireland under Essex and was knighted on the field by the Earl, to the great annoyance of Elizabeth. After long striving for preferment under James I, he became at length one of the tutors of Prince Henry, for whom he wrote some shrewd sketches of the bishops of Elizabeth's reign, entitled *A Brief Viewe of the Church of England* (first published 1653). He also composed many popular epigrams (complete ed., 1618). He died Nov. 20, 1612. Consult the memoir by C. Markham, prefixed to *Tract on the Succession,* Roxburghe Club (Edinburgh, 1880); *Nugæ Antiquæ,* miscellanies in verse and prose, ed. H. Harington (London, 1769; reëdited by Park, 1804); *Metamorphosis,* etc., edited by Singer (Chiswick, 1814).

HARIRI, hȧ-rē′rē, Abu Mohammed al-Kasim ibn Ali (c.1054–1122). A celebrated Arabic philologian and poet. He was born at Basra (about 1054) and died there (1122). Little is known of his life and circumstances save that he was the son of a silk merchant (whence his name Hariri, from *harir,* silk). Hariri wrote several valuable grammatical works, of which two have been published: *Durrat al-gaawas,* edited by Thorbecke (Leipzig, 1871), and *Mulhat al-irab,* edited and translated into French by Pinto (Paris, 1885–89). The most famous of all his writings, and one of the most remarkable compositions of all times and countries, is his book entitled *Makamat* (Sittings). It may be described as a novel, or a collection of 50 rhymed tales, loosely strung together, the centre of which is always a certain Abu Zaid from Seruj, who, witty, clever, amiable, of pleasing manners, well read in sacred and profane lore, but a thorough rogue, turns up under all possible disguises and in all possible places—sermonizing, poetizing, telling adventures and tales of all kinds—always amusing and always getting money out of his audience. It is witty, imaginative, dramatic, and displays a great command of language. There have been many translations and imitations, of which by far the best is by Rückert, *Verwandlungen des Abu Seid von Serug* (Frankfort, 1826); there are English translations by Chapellon (London, 1767), Preston (ib., 1850), and Chenery (ib., 1867). The text has been edited with notes by De Sacy (Paris, 1822; reëdited by Reinaud and Derenbourg, ib., 1847–53) and by Steingass (London, 1896). Consult Delatre, "Hariri, sa vie et ses écrits," in *Revue Orientale* (Paris, 1853).

HARIŚCHANDRA, hä′rĭsh-chän′drȧ. A mythological Hindu king of the solar dynasty, a descendant of Ikshváku, and one of the more prominent personages in the legendary history of ancient India. The earliest mention is made of him in the *Aitareya-Brāhmaṇa,* 7, 13–18 (see Veda), where he is the subject of one of the most interesting legends of the Vedic period. He is represented here as desirous of obtaining a son and of making a compact with the god Varuna, by which he proposed to sacrifice to the god his son, if he were granted one. Varuna accepted his prayer, and a son, Rohita, is born to the King. The *Aitareya-Brāhmaṇa* then proceeds to relate how Hariśchandra delayed, from time to time, the fulfillment of his part of the compact, until at last the son himself finds his own substitute in Sunahśepa, the child of another, who sells his son for 100 cows, to be offered in sacrifice to Varuna. Ultimately, however, Sunahśepa was released from his bondage through the intervention of the gods. The story is important in connection with early accounts of human sacrifices. According to the epic poem *Mahābhārata,* Hariśchandra was a type of munificence and piety, and after death became elevated to the court of Indra; and some of the Purānas are still more explicit on his fate. Having given his whole country, his wife and son, and finally himself, to Viśvamitra, in satisfaction of the demands made by this priest, Hariśchandra, in consequence of this act, became elevated with his subjects to the paradise of Indra, but, having been misled by Narada to boast of his merits, was again precipitated. The repentance of his pride, however, arrested his downward descent, and he and his train paused in midair, where his city is popularly believed to be at times still visible. Consult Wilson's translation of the *Viṣṇu-Purāṇa* (5 vols., London, 1864–77). *The Mārkaṇḍeya-Purāṇa,* bks. vii–viii, translated by Wortham in the *Journal of the Royal Asiatic Society* (London, 1881) and by Pargiter (Calcutta, 1904), is the source of an interesting Sanskrit drama which deals with the text or trial of Hariśchandra. This play, entitled *Caṇḍa-Kāuśika,* is accessible in the editions of Tarkalamkara (Calcutta, 1867) and Vidyasagara (ib., 1884) and in the translation by Fritze (Leipzig, 1882). Consult Macdonell, *History of Sanskrit Literature* (London, 1913).

HARIVANŚA, hä′rē-väɴ′shȧ. A Sanskrit epic composition of some 16,000 couplets, forming a supplementary book to the *Mahābhārata,* of which it professes to be a part. In many respects, however, it resembles a Purāna (q.v.). As its title, "Race of Hari, or Vishnu," implies, it is devoted largely to the life and adventures of Krishna as an incarnation of the god Vishnu. Its first part gives an account of creation, together with the legendary dynasties leading down to its main theme, the life of its hero, which forms the subject of the second part; its third or last part treats of the future age and decadence of the world. Some allusions in Sanskrit literature which connect it with the *Mahābhārata* show that it must have been as old as the fifth century A.D., in fact as old as certain portions of the great epic itself, although these are generally regarded as later portions. As a rule, the *Harivanśa* is not considered by scholars to be a work of great antiquity or value, although often quoted by later Sanskrit writers. There is a French translation by A. Langlois (Paris, 1834–35); and the best separate edition of the text was published in Bombay (1891). Consult Macdonell, *History of Sanskrit Literature* (London, 1913).

HARKAVY, här′kȧ-vĭ, Albert (Abraham Yakovlevich) (1839–). A Russian Orientalist and Hebrew rabbi, born at Novogrudok in Lithuania, and educated at Vilna and at the University of St. Petersburg. He studied in Berlin under Rödiger and Dümichen and in Paris under Oppert, and would have been appointed docent in St. Petersburg save for a personal enemy. As librarian of the Imperial Public Library of St. Petersburg, which is especially rich in Semitic manuscripts, he wrote *Studien und Mitteilungen aus der Sankt Petersburger kaiserlichen Bibliothek* (incomplete, 1879–92) and published, in Hebrew, several works on the Jews in Russia (1865 and 1867); in French, *Les mots égyptiens de la Bible* (1870) and *Sur un passage des 'Prairies d'or' de Maçoudi concernant l'histoire ancienne des Slaves* (1876); in German, besides the *Studien* already mentioned, contributions to Stade's *Zeitschrift für altestamentliche Wissenschaft*, a *Katalog der hebräischen Bibelhandschriften der kaiserlichen öffentlichen Bibliothek* (with Strack, 1875), *Altjüdische Denkmäler in der Krim* (1876), *Aus dem archäologischen Congress* (1882), *Neugefundene hebräische Bibelhandschriften* (1884); and in Russian, works on Mohammedan writers concerning the Slavs and Russians (1870), on the original home of the Semites, Indo-Europeans, and Hamites (1872); and contributed to the Russian edition of Gustav Karpeles' *History of Jewish Literature* (1890). He edited vols. vi and x in the Russian edition of Graetz, *History of the Jews* (Leipzig, 1883–1902), and wrote notes and additions to Rabinovich's Hebrew translation of the same work, vols. iii–viii (Warsaw, 1893–99).

HARK′NESS, Albert (1822–1907). An American classical scholar and educator, born at Mendon, Mass. He graduated at Brown University in 1842, was senior master of the Providence High School from 1846 to 1853, pursued studies in Germany at the universities of Berlin, Bonn, and Göttingen, and was the first American to obtain a degree from Bonn (Ph.D., 1854). In 1855 he was appointed professor of Greek in Brown University. He visited Europe in 1870 and 1883 and there investigated educational questions, in particular the methods of German and English universities. He assisted in founding the American Philological Association, of which he was a first vice president in 1869–70 and president in 1875–76. As a member of the Archæological Institute of America, he was appointed in 1881 to the committee on the expediency of establishing an American School of Classical Studies at Athens, an institution which was opened in 1882. In 1884 he was elected director of the school. He lectured extensively before learned societies, contributed valuable papers on original researches in philology to the *Transactions* of the American Philological Association, and from 1851 published a series of textbooks in Latin studies, of which it may be said that from them dated the beginning of a new era in the Latin department of classical education in America. The volumes include: *First Latin Book* (1851); *Second Latin Book and Reader* (1853); a *Latin Reader* (1865); *Introduction to Latin Composition* (1868, 1888); annotated editions of Cæsar's *De Bello Gallico* (1870, 1886), select orations of Cicero (1873, 1882), and Sallust's *Catilina* (1878, 1884); an annotated *Course in Latin Prose Authors* (1878); and a standard *Latin Grammar* (1864, 1881), published in a thorough revision with many additions as *A Complete Latin Grammar* (1898). Professor Harkness received the degree of LL.D. from Brown University in 1869.

HARKNESS, James (1864–). A Canadian mathematician, born in Derby, England, and educated at Trinity College, Cambridge. Coming early to the United States, he was connected with Bryn Mawr College from 1888 to 1903, for the last seven years as professor of mathematics. In 1903 he was appointed Peter Redpath professor of pure mathematics in McGill University, Montreal. He was for a time a vice president of the American Mathematical Society and associate editor of its *Transactions*, was elected a member of the London Mathematical Society, and in 1908 became a fellow of the Royal Society of Canada. He published, with Professor Frank Morley, two treatises on the *Theory of Functions* and collaborated on the article "Elliptic Functions," in the *German Encyclopædia of Mathematics* (1914–15).

HARKNESS, Robert (1816–78). An English geologist, born at Ormskirk, Lancashire. He was educated at Dumfries and at Edinburgh University (1833–34). His paper on *The Climate of the Coal Epoch*, read before the Manchester Geological Society in 1843, and subsequent papers on fossils and geology of southwest Scotland, established his reputation as a geologist, and in 1853 he was appointed to the professorship of geology at Queen's College, Cork, Ireland. In 1854 he was elected fellow of the Royal Society of Edinburgh and in 1856 fellow of the Royal Society of London. He was the first to demonstrate the existence of the Lower and Upper Silurian deposits in southern Scotland, and he did important work in the geology of the English lake district. His scientific papers, some 60 in number, are still of considerable value.

HARKNESS, William (1837–1903). An American astronomer, born at Ecclefechan, Scotland, a son of James Harkness (1803–78). He was educated at Lafayette College (1854–56), graduated from the University of Rochester in 1858, and studied medicine in New York City. He served as a surgeon in the Union armies during part of the Civil War. From 1862 to 1865 he was an aid in the United States Naval Observatory and then, after service on the monitor *Monadnock* (1865–66), was employed in the Hydrographic Office. During the eclipse of August, 1869, he discovered the coronal line *K 1474*. Three years later he was made a member of the Transit of Venus Commission, had charge of the party at Hobart, Tasmania, in 1879, and at Washington in 1882, when he became its executive officer. But his greatest fame rests on his theory of the focal curve of achromatic telescopes and on his invention of the spherometer, caliper, and other astronomical instruments. He was astronomical director of the Naval Observatory (1894–99) and director of the *Nautical Almanac* (1897–99). He retired two days after attaining the relative rank of rear admiral (December, 1899). He was president in 1893 of the American Association for the Advancement of Science. Of his works, the most important is *The Solar Parallax and its Related Constants* (1891).

HAR′LAN. A city and the county seat of Shelby Co., Iowa, 43 miles by rail northeast of Council Bluffs, on the West Nishnabotna River, and on the Chicago Great Western, the Chicago, Rock Island, and Pacific and the Chicago and Northwestern railroads (Map: Iowa, B 3). It is the commercial centre for a farming region, has a large cannery, and manufactures gas and gasoline engines, foundry products, hand looms, agricultural implements, bricks, flour, etc. Harlan is the seat of the Western Iowa Vocational College. The city owns its water works, electric-light plants, and sewer system. Pop., 1900, 2422; 1910, 2570.

HARLAN, James (1820–99). An American lawyer and legislator, born in Clark Co., Ill. He graduated at Indiana Asbury (now De Pauw) University in 1845, studied law, and, removing to Iowa, became Superintendent of Public Instruction in that State in 1847. In 1850 he was tendered the Whig nomination for Governor, but refused because he was under the required age. In 1853 he was chosen president of Iowa Wesleyan University, and two years later was elected to the United States Senate, but after he had served until January, 1857, his seat was declared vacant on a technicality. He was immediately reëlected by the Iowa Legislature, however, and was again reëlected on the expiration of his original term in 1861. He became very intimate with President Lincoln, his daughter Mary having married the President's son, Robert (q.v.). In 1865 President Lincoln appointed him Secretary of the Interior. After Lincoln's death he resigned to reënter the Senate and continued as one of the Republican leaders in that body until 1872, when he was defeated for reëlection by William B. Allison. From 1882 to 1885 he was presiding judge of the Court of Commissioners of Alabama Claims at Washington.

HARLAN, James S. (1861–). An American lawyer and commerce specialist, son of John Marshall Harlan. He was born at Evansville, Ind., graduated from Princeton University in 1883, and studied law in the office of Melville W. Fuller (q.v.) in 1884–88. Admitted to the bar in 1886, he practiced law in Chicago as a member of the firms of Gregory, Booth, and Harlan, and Harlan and Harlan. In 1901–03 he served as Attorney-General of Porto Rico. He became a member in 1906, and chairman in 1914, of the United States Interstate Commerce Commission.

HARLAN, John Marshall (1833–1911). An American jurist, born in Boyle Co., Ky. He graduated at Centre College in 1850 and at the law department of Transylvania University in 1853, practiced his profession for a time at Frankfort, and became judge of Franklin County in 1858. From 1861 to 1863 he served in the Federal army as colonel of the Tenth Kentucky Infantry. In 1863 he was elected Attorney-General of Kentucky and resigned from the army to assume the duties of that position, which he held for four years. He was a Republican candidate for Congress in 1871 and 1875, but was each time defeated, and in 1877 was appointed by President Hayes a member of the Louisiana Commission, which was formed to inquire into and settle the civil controversies of the reconstruction period in that State and to aid in the establishment of a regular and stable government. In November, 1877, he was appointed an associate justice of the United States Supreme Court, a position which he filled with distinguished ability for 34 years. He was a judge of marked independence and intellectual vigor and a zealous upholder of popular rights. These qualities were consistently displayed in his decisions. In the Income Tax cases, in which the power of Congress to lay such a tax was ultimately denied, he was one of the four (originally five) justices who upheld the validity of the tax; in the Granger cases he voted with the majority which affirmed the power of a State legislature to regulate a railroad or other business affected with a public interest; and in the Trust cases, instituted by the government for the dissolution of the Standard Oil and American Tobacco companies, he supported the judgment of the court which pronounced those companies to be illegal combinations under the Sherman Act and decreed their dissolution; but he dissented vigorously from the view of the majority of his colleagues that the act in question was to be interpreted "in the light of reason," i.e., that it was for the court to say in a given case whether a combination in restraint of trade was illegal or not.

HAR′LAND, Henry (1861–1905). An American novelist, born at St. Petersburg, Russia. Of New England ancestry, he was educated in New York City and at Harvard University, and, after traveling in Europe as a correspondent and serving for a time in the Surrogate's Office in New York City, removed to London, where, among other labors, he edited *The Yellow Book.* Notable among his books are: *As It Was Written* (1885); *Mrs. Peixada* (1886); *The Land of Love* (1887); *The Yoke of the Thorah* (1887); *My Uncle Florimond* (1888); *Mr. Sonnenschein's Inheritance* (1888); *A Latin Quarter Courtship* (1889). Later he produced *Mea Culpa* (1893), and won deserved success with *The Cardinal's Snuffbox* (1900), *The Lady Paramount* (1902), and *My Friend Prospero* (1904). His earlier novels, which dealt with American Jewish life, were written under the name "Sidney Luska."

HARLAND, Marion. The pseudonym of the American novelist Mary Virginia Hawes Terhune (q.v.).

HAR′LAW. A locality in Scotland, about 18 miles northwest of Aberdeen, noted as the scene of a battle fought July 24, 1411, between the Highlanders under Donald, Lord of the Isles, and the forces of the Lowlands under Alexander Stewart, Earl of Mar. The Highlanders were defeated with the loss of nearly 1000 men. The battle of Harlaw passed into legend as one of the most desperate attempts on the part of the Celtic tribes of Scotland to stem the tide of Anglo-Norman invasion.

HARLAY DE SANCY, *de* sȧn′sē′, Nicolas. See Sancy, Nicolas Harlay de.

HARLEIAN (här-lē′an *or* här′lē-an) **COLLECTION.** A valuable collection of manuscripts in the British Museum (q.v.), consisting of 7639 volumes and 14,236 original rolls, charters, deeds, and other legal documents. The collection, made by Robert Harley, first Earl of Oxford (1661–1724), and by his son, Edward Harley (1689–1741), was purchased by the English government from Lady Oxford in 1753 for £10,000 and deposited in the British Museum. The collection is indexed. Consult E. S. Roscoe, *Life and Times of Robert Harley, Earl of Oxford* (New York, 1902).

HAR'LEM. A town in the Netherlands. See Haarlem.

HARLEM. A local name for that part of New York City above 106th Street between the East and Harlem rivers and Eighth Avenue. The original settlement, which had come into being as early as 1636, was on the site of the present Mount Morris Park, and in 1658 was named by Peter Stuyvesant New Haarlem (or Nieuw Haerlem), in memory of Haarlem, the Dutch town whence many of the settlers came. It was a quaint Dutch village, mainly of private residences surrounded by gardens and farms, and retained its character and its isolation until about 1830, when daily communication with New York was established. On about the site to-day of Barnard College of Columbia University was fought, on Sept. 16, 1776, the battle of Harlem Heights, in which the British troops were repulsed by the Americans. The old village of Harlem is quaintly described by Washington Irving in the *Knickerbocker's History of New York.* Consult: Pierce, *New Harlem, Past and Present* (New York, 1904); Riker, *History of Harlem* (new ed., ib., 1904); Johnston, *The Bank of Harlem Heights* (ib., 1897).

HARLEM RIVER. A tidal channel from 100 to 400 feet wide, separating Manhattan Island, New York City, from the mainland (Map: Greater New York, E 4). A short ship canal across the northern end of Manhattan Island, between the Hudson and the Harlem, was opened in 1895. The river has considerable commercial importance, though the channel is narrow and crooked. It is navigable only for steam vessels. The Harlem is spanned by a number of bridges, the finest being Washington Bridge and High Bridge, the latter an aqueduct bridge. A fine roadway, known as the Speedway, has been constructed along the western shore of the Harlem. On a lofty eminence on the opposite shore are the beautiful buildings of New York University.

HARLEQUIN, här'lė-kwĭn (OF. *harlequin,* Fr. *arlequin,* It. *arlecchino,* from OF. *herlequin, herlekin, hellequin, hellekin,* demon, from the Germanic; cf. AS. *helle cynn,* folk of hell; scarcely from It. *il lechino,* plate licker, in allusion to the gluttony of the primitive Harlequin). One of the most noted of the conventional personages in pantomime (q.v.). The character developed in the early popular comedies of Italy (*commedia dell' arte*). Attempts to trace him back to the Roman *Atellanæ* and the mimic *Sannio,* through the Italian word *zanni,* are inconclusive. When the persons in the extempore comedy represented local types, Harlequin stood for Bergamo, just as did his brother *zanni,* Scapino, commonly for Naples, and Pantalone, the old man whom Arlecchino served, for Venice, while "the Doctor," Scapino's master, was supposed to be a pedant from Bologna. Harlequin is a suitor of Columbine and gets her away from poor Pedrolino (the French *Pierrot*). Though full of amusing blunders, Harlequin combines his childlike capers with a good deal of mature *finesse.* He is represented with a tight suit of party-colored patches, a black mask, and a wooden swórd. When he was introduced into France in the sixteenth century, the witty side of his character was more fully developed, and he was speedily adopted by other nations. Famous among the Harlequins of France in the seventeenth and eighteenth centuries were Domenico Biancolelli, called from Vienna to Paris by Mazarin about 1660; Vizentini, known as Thomassin and Bertinazzi, called Carlin, who won the admiration of Garrick. The first English Harlequin is said to have been Joe Haines in 1667. During the eighteenth century, when pantomime became so popular at Drury Lane in Rich's time, Harlequin's name was attached to numerous pieces, such as *Harlequin Dr. Faustus* (1723) and *Harlequin, a Sorcerer,* a little later. Two other noted English Harlequins were Joseph Grimaldi (q.v.) and Tom Ellar, who died in 1842. The modern Christmas pantomime preserves the elements of the legendary plot, the lovers Harlequin and Columbine being favored by fairy interference in despite of their persecutors, Clown and Pantaloon. The word "harlequin" has come to be commonly used, however, in a general sense almost synonymous with "clown."

Consult: Moeser, *Harlekin oder Vertheidigung des Grotesk-Komischen* (Leipzig, 1771; trans. by Warnecke, London, 1766); Reynaud, "Quelques mots sur Arlequin," etc., in *Etudes romanes dédiées à Gaston Paris* (Paris, 1891); Broadbent, *A History of Pantomime* (London, 1901); Driesen, *Der Ursprung des Harlekin* (Berlin, 1904).

HARLEQUIN CABBAGE BUG, or Calicoback. A bug (*Murgantia histrionica*) noted as a very destructive enemy to cruciferous vegetables in the southern United States. It is an oval, somewhat flattened black bug with bright red and yellow markings, whence the names "harlequin" and "calico." It lives throughout the year on cabbage, radish, mustard, and other cruciferous plants, puncturing the leaves with its beak and causing them to wither and dry. The eggs, which resemble miniature white barrels with black hoops, are laid in a double row on the underside of the leaves. There are several generations in a year, and the adult bugs hibernate. It is the worst enemy of the Southern cabbage growers on account of the difficulty of destroying it. Mixtures made strong enough to kill the bugs kill the plants also. The best method is to plant an early trap strip of mustard, upon which the overwintering bugs will cluster in the spring, and upon which they may be killed with pure kerosene. This is originally a Central American insect and has been spreading towards the northeast for 40 years or more. It is now found in southern New Jersey and in most of the intervening territory southwest to the Rio Grande.

HARLEQUIN DUCK. A name given, in allusion to its variegated colors, to a rare duck (*Histrionicus histrionicus*) inhabiting the polar regions and occasionally seen in northern Europe and Canada. It is a near relative of the now extinct Labrador duck. Several other sorts of birds have been called harlequins because of their quaintly contrasted colors.

HARLEQUIN SNAKE (so called from the coloring). The small red and black venomous coral snake (*Elaps fulvius*) of Florida, also called "candy-stick." See CORAL SNAKE.

HARLESS, här′lĕs, GOTTLIEB CHRISTOPH ADOLF (1806–79). A German Protestant theologian, born in Nuremberg. He studied theology at Halle and Erlangen and became professor of theology at the latter institution in 1836. For his opposition in the Bavarian Diet of 1842 to the order requiring persons in the army to kneel at the passing of the sacramental host, he was removed from his professorship. In 1845, however, he was chosen to the consistory of Bayreuth, professor of theology at Leipzig, and court preacher. In 1852 he was made president of the Protestant consistory of Munich. Among his many important works are *Theologische Encyklopädie und Methodologie* (1837) and *Die christliche Ethik* (1842; Eng. trans., 1868). His autobiography, entitled *Bruchstücke aus dem Leben eines süddeutschen Theologen,* was published in 1872.

HAR′LETH, GWENDOLEN. The heroine of George Eliot's *Daniel Deronda.*

HARLEVILLE, J. F. COLLIN D'. See COLLIN D'HARLEVILLE.

HAR′LEY. The hero of Henry Mackenzie's *Man of Feeling.*

HARLEY, SIR EDWARD (1624–1700). An English Parliamentarian, born in Brampton-Bryan, Herefordshire. Educated at Shrewsbury, Gloucester, and Oxford, he studied law, but took up arms in the Parliamentary cause against the King in 1642, though disapproving of military supremacy in the nation. By 1646 he was a member of Parliament for his native county, but his opposition to Cromwell brought about his banishment from it for 10 years, though he was rewarded at the Restoration by Charles II, who made him Governor of Dunkirk (1660). Despite his changes of front (for he was against the Stuarts once more at the revolution of 1688), Harley was a conscientious upholder of the rights of the people, who showed their appreciation by sending him continuously to Parliament. Though a churchman himself, he fought against any form of persecution of the dissenters, was without party prejudice, and was remembered more for his practical benefactions than for such theoretical performances as *A Scriptural and Rational Account of the Christian Religion* (1695).

HARLEY, ROBERT, EARL OF OXFORD AND MORTIMER (1661–1724). An English statesman. Descended from an illustrious family of Herefordshire, he was born in Covent Garden, London, on Dec. 5, 1661. His father, Sir Edward Harley, had been a military officer, a member of Parliament, and an opponent of Cromwell during the Civil War. Robert, first elected to Parliament for the borough of Tregony in 1689, was at first a Whig, but gradually changed his politics till he became leader of the Tory and Church party. His cleverness and tact, however, retained for him the support of many Whigs and Dissenters. He shortly acquired a great reputation for his knowledge of parliamentary law and practice, a study not much pursued in those days; and in the Parliament which met under the chieftainship of Rochester and Godolphin in February, 1701, he was elected Speaker by a large majority. Harley retained his post, having been twice reëlected, till 1705. In 1704 he became a member of the Privy Council and Secretary of State. Assisted by his cousin, Abigail Hill—afterward Lady Masham—he excited Queen Anne against her Whig ministers, Marlborough and Godolphin, who in turn plotted against him. By convicting Harley's secretary of treasonable correspondence with France, they caused Harley himself, though entirely exculpated, to resign his office in February, 1708. Harley, on his part, by persistently working on the Queen through Lady Masham during his two years of retirement, finally brought about the overthrow of the Whigs. In August, 1710, Godolphin was dismissed, and Harley, appointed to the post of Chancellor of the Exchequer, brought back the Tories. An event occurred in 1711 which raised him to the acme of popularity. A French priest and spy, who assumed the title of Marquis de Guiscard, when brought before the Council on March 8, on the charge of treasonable correspondence with the French, rushed upon Harley and stabbed him with a penknife. He fell dangerously ill from the wound; and when he recovered he was congratulated by Parliament on his escape, created Earl of Oxford and Mortimer, appointed Lord High Treasurer of Great Britain, and in the year following was decorated with the Garter. From this point Harley's course was downward; he was not a man of business and was destitute of decision of character. He was an astute political leader, but lacked sincerity, breadth of view, and, in brief, all other noble qualifications. The principal act of his administration was the Treaty of Utrecht. Harley ceased to pay court to Lady Masham, and Bolingbroke succeeded in getting him dismissed on July 27, 1714. Lord Oxford retired on Tuesday; Bolingbroke became Premier; and the Queen died on Sunday. George I was proclaimed, and the period of Tory ascendancy came to an abrupt end. The conduct of both the Tory leaders in their relations with the Stuarts had been such as to render their impeachment possible as well as probable. In March, 1715, Bolingbroke fled to France, but Oxford remained to meet his fate. He was sent to the Tower, and after two years' imprisonment brought to trial on a charge of treason. The two Houses quarreled about the mode of procedure, and as the Commons in anger refused to take any part in the trial, he was acquitted by the peers and released. He spent the remainder of his life in retirement. He was the founder of a collection of books and manuscripts, which perpetuates his name. See HARLEIAN COLLECTION.

Bibliography. Burnet, *History of my Own Time* (6 vols., London, 1838); Macaulay, *History of England* (ib., 1855); Stanhope, *History of England, Comprising the Reign of Queen Anne until the Peace of Utrecht* (ib., 1870); Lecky, *History of England in the Eighteenth Century* (ib., 1878–90); Manning, *Speakers of the House of Commons* (ib., 1851); Lodge, *Portraits of Illustrious Personages of Great Britain* (ib., 1850); Howell, *State Trials* (ib., 1809–26); Boyer, *Political State of Great Britain* (ib., 1724); Roscoe, *Robert Harley, Earl of Oxford, Prime Minister, 1710–14* (ib., 1902).

HARLEZ, är′lā′, CHARLES DE (1832–99). A Belgian Orientalist who attained to special eminence in the fields of Iranian and Chinese philology. He was born at Liége, was educated at the university there, and afterward took clerical orders and rose to be a distinguished prelate in the Catholic church, with the title of monsignor. His interest in the Orient early attracted him to the study of Sanskrit and Avestan, and in 1867 he became actively engaged in teaching these subjects at the University of Louvain. His translation of the Avesta, *Livre sacré des sectateurs de Zoroastre* (1875–77; 2d ed., 1881), still holds a high rank among scholars. It was followed by a series of other studies in Zoroastrianism: *Etudes avestiques* (1878); *Les origines du Zoroastrisme* (1879); *L'Exégèse des textes avestiques* (1883); and several grammars or manuals for the study of Sanskrit (1877; 2d ed., 1885); Avesta (1879; 2d ed., 1880); Pahlavi (1880), including one also on Manchu (1884).

About 1884, in connection with his researches into the language of Manchuria, he began to turn from Persia and India to China, and he devoted the remainder of his life to investigations connected with the literature, language, and life of China herself. A long series of monographs or volumes from his pen on the subject of Chinese was the result. These are to be found published in the Annals of the Musée Guimet, of Paris, and in the Memoirs of the Royal Academy of Belgium, of which he was a member. The *Essai d'anthropologie chinoise* (Brussels, 1896) and "Les figures symboliques du Yi-King," in *Journal Asiatique*, 1897, pp. 223–287, may be mentioned among his works in this field. In 1896 a large number of his pupils and friends issued a volume in honor of this distinguished scholar; it bears the title *Recueil de travaux d'érudition offert à Mgr. Charles de Harlez* (Leyden, 1896). The breadth of Harlez's studies and interest is shown likewise by his acquaintance with several of the American languages and also with Magyar literature.

HARLINGEN, här′lĭng-*en* (Frisian *Harns*). A seaport of the Netherlands, in the Province of Friesland, situated on the Zuyder Zee, 16 miles west of Leeuwarden, with which it is connected by rail and canal, about 65 miles north-northeast of Amsterdam (Map: Netherlands, D 1). The town is cut up by canals and is built on the site of a city which was swept away by an inundation in 1134. It has a school of navigation. Harlingen carries on an active trade with England and Norway, exporting the agricultural products of the Province of Friesland, and importing timber, hemp, jute, and raw cotton in considerable quantities. It is connected by steamship lines with Amsterdam, Hull, and London. The harbor is an excellent one, reconstructed in 1870–77 and protected by enormous dikes. The town possesses a statue of Caspar de Robles, the Spanish Governor who rebuilt the dikes after the inundation of 1566. Pop., 1900, 10,448; 1910, 10,574.

HAR′LOWE, CLARISSA. The heroine of Richardson's *History of Clarissa Harlowe.*

HARMACHIS, här′mȧ-kĭs (Egyptian *Hormtakh*, Horus in the two horizons). An Egyptian god, a manifestation of Horus (q.v.). According to certain inscriptions, the gigantic Sphinx (q.v.) near the pyramids of Gizeh, perhaps a work of Chephren (q.v.), represented this god; but he is usually represented in the form of a hawk.

HAR′MALINE AND HAR′MINE (from Neo-Lat. *harmala*, from Ar. *harmal*, Syrian rue). Two vegetable bases occurring in the husk of the seeds of the *Peganum harmala*, or Syrian rue, a plant that grows abundantly in the steppes of southern Russia. *Harmaline*, $C_{13}H_{14}N_2O$, when pure, crystallizes in colorless prisms which melt at 238° C. (460.4° F.). *Harmine*, $C_{13}H_{12}N_2O$, crystallizes in delicate prisms which melt at about 258° C. (496.4° F.). The red coloring matter known in commerce as *harmala red* is obtained from the seeds of the same plant. The *Peganum harmala* belongs to the natural order Zygophyllaceæ. It is a half-shrubby plant, with smooth linear pinnate or bipinnate leaves and solitary white flowers. The seeds are used by the Turks as a spice.

HARMAN, A. See HERRMANN, A.

HAR′MAN, HENRY MARTYN (1822–97). An American educator and scholar, born in Anne Arundel Co., Md. He graduated from Dickinson College in 1848. For two years he was professor in the Baltimore Female College and for about 10 years with the Light Street Institute, Baltimore. In 1868 he was professor in West Virginia University; he traveled abroad for a year; in 1870 he became professor of ancient languages and literature in Dickinson College; and at the latter institution he held the chair of Hebrew and Greek from 1879 until his retirement, in 1895. He was a member of the Society of Biblical Literature and Exegesis. His writings include *A Journey to Egypt and the Holy Land* (1873) and *Introduction to the Study of the Holy Scriptures* (1884).

HAR′MAR, JOSIAH (1753–1813). An American soldier, born in Philadelphia, Pa., and educated at the Quaker School of Robert Proud. At the outbreak of the Revolutionary War he entered the patriot army as captain in a Pennsylvania regiment. He became its colonel in 1777, was promoted in 1783 to be brevet colonel in the first United States regiment, became brevet brigadier general in 1787, and on Sept. 29, 1789, was made commander in chief of the United States army. In order to punish the Indian tribes of the Northwest, who had been incited to hostilities by British agents, an expedition under the command of Harmar was sent out from Fort Washington, on the site of the present Cincinnati, in 1790. He inflicted considerable damage in desolating the country through which he passed; but in a battle with the Miamis, fought in September of that year, the main body of troops was left unsupported in consequence of an advance sortie of the cavalry and some militia, and after a severe defeat the expedition returned to Fort Washington. Harmar resigned his commission in 1792 and from 1793 till 1799 was adjutant general of Pennsylvania.

HARMAT′TAN (through the Arabic; probably from the native name). A very dry wind along the west coast of northern Africa from the Gulf of Guinea to Senegambia. This wind blows from the interior of northern Africa or the Desert of Sahara southward and westward, and is felt over the Atlantic Ocean to a considerable distance from the ocast. It prevails especially during December, January, and February, with occasional occurrences in November and March. On the Gold Coast it blows from the northeast in the nighttime, but from the southeast at midday. During its prevalence the sky is cloudless and the regular diurnal variations of temperature are large; the morning minimum temperatures are lower and the midday maximum temperatures slightly higher; the relative humidity is from 25 to 50 per cent below the normal, and this dryness produces rapid evaporation and a profound sensation of coldness. The barometric pressure is slightly higher during the first part of the Harmattan, and the wind, when once started, lasts for several days, or in extreme cases for several weeks. Vegetation is dried up very much as in the case of the dry winds of California and the plains on the eastern slope of the Rocky Mountains. The natives, being thinly clad, can prevent the skin from cracking and keep it soft and pliable only by anointing the body with oils or fats.

A peculiar whitish haze usually accompanies the Harmattan; this is due to the presence of an immense number of fragments of the microscopic shells of diatoms, together with other foreign matter floating in the air. As seen through this haze, the sun and moon have a reddish tint. This diatomaceous dust is undoubtedly brought by the wind from the interior, possibly from the desert itself. The Harmattan wind is usually cool and dry, but in a few localities it is warm and dry. Everything points to the fact that it is a descending wind blowing out from under the great area of moderately high pressure that prevails over the Sudan, and towards an area of moderately low pressure temporarily prevailing over the equatorial part of the Atlantic Ocean. This wind blowing from the Sudan northward towards Europe becomes the Sirocco of Italy. The same wind blowing over the desert itself and carrying great clouds of sand gives rise to the Simoon. The cool, dry, cloudless weather and hazy horizon that prevail occasionally in the eastern portion of the United States and especially in the dry months of California are analogous to the African Harmattan. See Dust, Atmospheric.

HARMENOPULOS, här′mĕn-ŏp′ṳ-lŏs, Konstantinos (c.1320–c.1380). A Byzantine jurist, an Imperial counselor under Cantacuzenus and John Palæologus and later a judge in Thessalonica. His *Hexabiblos* (ed. by Heimbach, 1851) had much use through the Middle Ages and is still an authority in modern Greece. Consult Dirksen, *Das Rechtsbuch des Harmenopulos* (Berlin, 1847).

HARMENSEN, Jacob. See Arminius, Jacobus.

HARMINE. See Harmaline.

HARMO′DIUS and **AR′ISTOGI′TON** (Lat., from Gk. ʽΑρμόδιος, ʼΑριστογείτων). Two Athenian citizens, of the family of the Gephyræi. Harmodius was a beautiful youth who ardently loved his relative Aristogiton. Hipparchus, son of the tyrant Pisistratus, endeavored to separate the two friends and to secure the friendship of Harmodius for himself, but, not succeeding, avenged himself by insulting publicly the sister of Harmodius. Thereupon Harmodius and Aristogiton laid a plot to slay both Hipparchus and his brother Hippias on the day of the great Panathenaic festival (514 B.C.). The plot miscarried because a premature attack was made. Hipparchus was slain, but Harmodius was at once killed by the guards. Aristogiton fled, but was afterward taken and executed; though put to the torture, he did not disclose the names of the real conspirators. Hippias was afterward expelled (510 B.C.) and then and in all later times Harmodius and Aristogiton were honored as martyrs who had fallen in the cause of liberty. Their praises were sung in drinking songs, and they received almost divine honors. Two bronze statues, made by Antenor (q.v.), an Athenian sculptor, were set up in their honor in the Agora; these were carried away by Xerxes at the time of the Persian War, but were afterward brought back by Alexander the Great. Other statues by Critius and Nesiotes, however, in 477 replaced those carried away by the Persian King. Of these a copy is believed by good scholars to be extant, in the Museo Nazionale at Naples. Consult Baedeker, *Southern Italy and Sicily* (16th Eng. ed., Leipzig, 1912). The descendants of Harmodius and Aristogiton enjoyed freedom from taxation and from all public duties. Consult: Harrison and Verrall, *Mythology and Monuments of Ancient Athens* (New York, 1890); Frazer, *Pausanias,* vol. ii (Cambridge, 1913); E. A. Gardner, *A Handbook of Greek Sculpture* (London, 1911); and the better histories of Greece.

HAR′MON, John. The hero of Dickens's *Our Mutual Friend.*

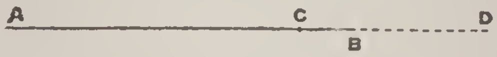
HARMON, Judson (1846–   ). An American lawyer and public official. He was born at Newtown, Ohio, and graduated at Denison University in 1866 and at the Cincinnati Law School in 1869. He was originally a member of the Republican party, but left it in the Greeley-Grant campaign of 1872. He was elected mayor of Wyoming, Ohio, in 1875 and judge of the Superior Court of Cincinnati in 1878; but nine years later he returned to active practice, from which, in 1895, he was called to succeed Richard Olney as Attorney-General in President Cleveland's second cabinet. His "trust policy" was to make guilt personal and prosecute criminally. In 1897 he was elected president of the Ohio Bar Association, and in the same year he became professor of agency in the law department of the University of Cincinnati. He served as Governor of Ohio (1909–13) and was a prominent rival of Woodrow Wilson for the presidential nomination in the Baltimore convention of 1912.

HARMO′NIA (Lat., from Gk. ʽΑρμονία). In the Theban legend, the daughter of Ares and Aphrodite, and wife of Cadmus (q.v.), who received her after slaying the dragon. The wedding was attended by all the gods and in the Theban cycle seems to have occupied as prominent a place as that of Peleus and Thetis in the tale of Troy. Among the wedding gifts were a mantle and a necklace, the work of Hephæstus, which played a large part in the later legend, as bringing ruin to their possessors; with the necklace Polynices bribed Eriphyle to betray her husband, Amphiaraus (q.v.), to his death. (See Alcmæon; Phegeus.) When Cadmus was introduced into the Samothracian mysteries, Harmonia became the daughter of Zeus and Electra and sister of Dardanus and Iasion, and the marriage was celebrated at Samothrace (q.v.). Another version told how Cadmus carried off Harmonia, who was sought during the mysteries, as Kore at Eleusis. Harmonia seems originally to have been a goddess of love and the harmonizing power of nature. Different in origin is the Attic Harmonia, who joins in the chorus of Muses and Graces, as companion of Aphrodite, and even, in Euripides, becomes mother of the Muses. In this version of the story she is simply a personification of order and harmony; a Roman counterpart to her is Concordia. Consult Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911), and the article "Harmonia," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft,* vol. vii (Stuttgart, 1912).

HARMON′ICA (Neo-Lat. nom. sing. fem., from Lat. *harmonicus*, Gk. ἁρμονικός, *harmonikos*, harmonious, musical, from ἁρμονία, *harmonia*, harmony). A musical instrument, invented by Benjamin Franklin. The instrument consisted of a series of glasses, each one in the shape of a cup, or half globe, being put into a revolving motion on its centre by means of a treadle, while the moistened rim was touched by the finger. Franklin, in a letter dated July 13, 1762, to Padre Beccaria, at Turin, mentions the history of his invention. An Irishman named Pockrich was the first to hit on the idea of playing airs on a row of glasses, which he tuned by putting water into each. He performed publicly in London; but he and his glasses were burned in a conflagration in London in 1750. When Franklin finished his invention, he found an excellent performer in a Miss Davis, to whom he made a present of his harmonica. Miss Davis in 1765 performed on the harmonica in Paris, Vienna, and all the large cities of Germany with great effect. The compass of its notes was from c to f^2 including all the chromatic semitones. Consult K. F. Pohl, *Zur Geschichte der Glasharmonika* (Vienna, 1862).

HARMON′IC CURVE. A curve formed by the vibration of a musical string. The curve of sines (q.v.) is a simple harmonic curve. The name "harmonic" was used in this connection by the Greek geometers in investigating the theory of music.

HARMONIC DIVISION. In geometry, a line segment AB is said to be *harmonically divided* when two points are taken, one in the segment and the other on the segment produced, as C and D, such that



$$AC : CB = AD : DB.$$

Four quantities, a, b, c, d, are said to be in *harmonic proportion* when their reciprocals $\frac{1}{a}$, $\frac{1}{b}$, $\frac{1}{c}$, $\frac{1}{d}$ are so related that $\frac{1}{b} - \frac{1}{a} = \frac{1}{d} - \frac{1}{c}$. The "harmonic mean" of two numbers, a, b, is $\frac{2\,ab}{a+b}$. It is the reciprocal of the arithmetic mean of the reciprocals of the two numbers.

HARMON′ICON (Neo-Lat., from Gk. ἁρμονικόν, *harmonikon*, neut. of ἁρμονικός, *harmonikos*, harmonious, musical), CHEMICAL. An apparatus consisting of an open glass tube, the air in which may be made to give a sound resembling a musical note when it is held over a jet of burning hydrogen. The sounds produced arise from the successive explosions formed by the periodic combinations of the oxygen in the air with the hydrogen. The note depends on the size of the flame and the length of the tube, and with a long tube, by varying the position of the jet in the tube, a series of notes may be produced. This phenomenon, which was discovered by Lampadius, has been investigated by Tyndall and described in his *Lectures on Sound.* Before the jet is lighted, in an actual experiment, the formation of hydrogen must be allowed to go on until the air is completely driven out of the generating bottle; otherwise a dangerous explosion may take place.

HARMONIC PROGRESSION. See SERIES.

HARMONIC PROPORTION. See HARMONIC DIVISION.

HARMONICS (from Lat. *harmonicus*, harmonious, musical). The accessory or concomitant tones produced by any fundamental tone. When a string tuned to C, e.g., is set in motion, it produces not only that one note, but a number of other tones less intense. These secondary tones are so much weaker than the fundamental that it requires even the closest attention of a fine ear to detect their presence. Mersenne, a Franciscan monk who died in Paris in 1648, was the first who discovered this. But it was not until 1701 that Sauveur gave a scientific explanation. Rameau availed himself of Sauveur's investigations and founded his new system of harmony upon that basis. When the string C vibrates, it swings not only in its entire length, but at the same time smaller oscillations are produced by the two halves, the three thirds, the four fourths, etc., of the string. Tones can be distinguished for every division of such a string up to one-sixteenth. The two halves vibrating produce each the octave; the three thirds each the fifth above the octave; the four fourths each the fourth above the fifth, etc., of the fundamental tone. This is illustrated by the following table (1 denoting the entire length of the string, 2 one-half, 3 one-third, etc.):

						x				x		x	x	x	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C,	c,	g,	c^1,	e^1,	g^1,	$b\flat^1$,	c^2,	d^2,	e^2,	$f\sharp^2$,	g^2,	$a\flat^2$,	$b\flat^2$,	b^2,	c^3.

The tones marked x are only approximately correct. The eleventh tone, e.g., is neither *f* natural nor *f* sharp, but one between these and nearer to the latter than the former. As all these tones lie above the fundamental, they are called *overtones;* because they are produced by vibrations of only a part of the string, they are also called *partial tones*, or *aliquot tones.* The name *harmonic tones* is given to them because all the tones that are given in their true pitch, except the ninth (d^2), are elements of the fundamental triad (C, E, G). The intensity of the harmonic tones decreases in inverse ratio to their pitch. The lowest tone, C, is called the *generator.* It will easily be seen how from these overtones the consonance of the major triad is established, for each of the elements occurs more than once in the series. F♯, A♭, B♭, and B are not given in their true pitch, and D occurs only once in the whole series.

Taking a high tone, c^3, e.g., a series of tones lying below, and bearing the same relation to the highest tone as the overtones to the fundamental, or generator, is produced. These tones are called *undertones*, or *lower partials.* The following table illustrates this (notes produced only with approximate correctness being again marked x):

						x				x		x	x	x	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
c^3,	c^2,	f^2,	c^1,	a♭,	f,	d,	c,	B♭,	A♭,	G♭.	F,	E♭,	D,	D♭,	C.

In this series D♭, D, E♭, and G♭ are not given in true pitch, and B♭ occurs only once. F, A♭, C, occur each more than once. They are the elements of the F minor triad; hence the consonance of the minor triad is established by the series of *undertones* in the same manner as the consonance of the major triad is established by the series of *overtones.* From the consonance of these *chords* the consonance of *intervals* is also determined, for all intervals found in these chords or their inversions are regarded as consonant. The second inversion of either the major or minor triad—i.e., with the fifth as the bass tone (see INVERSION)—yields the intervals of the fourth and major and minor sixth respectively. The only intervals not derivable from the above two series are the second and seventh, which are therefore regarded as dissonant, as well as any chord into the formation of which they enter. See INTERVAL.

What has been said about the vibrations of a string applies equally to the vibrations of a column of air. On any stringed instrument harmonics can be produced by lightly touching with the finger tip any nodal point of the string. (See NODE.) The string then cannot vibrate in its entire length, but only in sections, the length of which is determined by the length of that part of the string lying between the neck of the instrument and the nodal point touched by the finger. For instance, if the lowest string of the violoncello (C) is lightly touched at the middle point between the neck and the bridge, the two sections will vibrate independently, and each half will produce the octave above the tone to which the string is tuned. Thus, instead of C, its next higher octave, *c*, will be heard. Touching the string at one-third of the distance between the neck and the bridge, it will vibrate in three independent sections, each producing the twelfth (or fifth above the octave) of the fundamental note. All the partial tones given in the above table can thus be produced by touching a point at one-fourth, one-fifth, etc., the length of the string. Tones thus obtained from an open string are called *natural harmonics.* Harmonics can also be obtained by first stopping a string, i.e., pressing it firmly to the finger board, by one finger and touching it lightly with another finger at some nodal point between the pressed-down finger and the bridge. Tones produced in this manner are called *artificial harmonics.* Harmonics are distinguished from tones produced in the ordinary manner by a peculiarly sweet and ethereal quality. The opening bars of the prelude to *Lohengrin* are a splendid example of the effect produced by harmonics. In musical notation harmonic tones are indicated by a ° placed over the note or by open square notes ◊. On wind instruments (both brass and wood) harmonic tones are produced by varying the intensity and direction of the air current. The pressing down of a valve has the same effect as the pressing down of a finger on a stringed instrument. Consult Hauptmann, *The Nature of Harmonics and Metre* (2d ed., London, 1892), and H. Riemann, *Die Natur der Harmonik* (Leipzig, 1882). See CLANG TINT.

HARMONIC STOP. An organ stop, having pipes double the usual length and pierced midway, so that the tone produced is an octave higher than the ordinary pitch. See ORGAN.

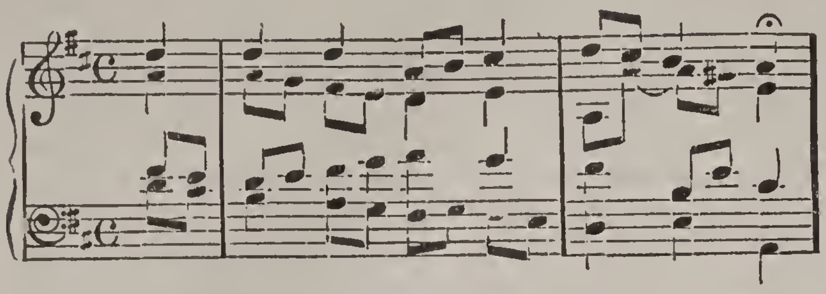
HARMO'NIOUS BLACKSMITH, THE. An old tune to which Handel wrote variations, and the composition of which, after his death, was ascribed to him. The composer of the original is unknown.

HAR'MONISTS, or HARMONY SOCIETY. A communistic society, formed by John George Rapp (born in Iptingen, Württemberg, in 1857) and some 750 others, mostly from Württemberg. These people came to America for various reasons—many, George Rapp among them, because they were at variance with the Church and the government. Rapp taught that the Church had wandered far from its original estate; at the same time he insisted on laboring on Sunday and refused to send his children to school. He, and those of like mind, were therefore prosecuted, and fined, and imprisoned. This led finally to a determination to seek more congenial quarters. In 1803 Rapp and two others, as a party of exploration, contracted for the purchase of a tract of 5000 acres in Butler Co., Pa., and to this place there followed 140 families. The exigency of their condition (they had but little money) forced him to put their money into one common fund. They therefore entered into articles of association on Feb. 15, 1805, the substance of which was "each for all and all for each in sickness and in health." Coincident with the signing of the articles, they proceeded to an election of officers. John George Rapp was elected head of the society. Frederick Reichert was elected to be the manager of its business, commerce, etc., and a board of elders was also elected, for the enforcement of the society's rules and regulations. They called their town Harmony and their society the Harmony Society. In 1807 celibacy was advocated by some, and, although Rapp did not entirely bar it, this gradually became a custom—there were few births in after years. Agreeably to Rapp's request, Frederick Reichert became Rapp's adopted son and took the former's name. Under Frederick Reichert's management the society prospered, but he soon wished for a location better suited to his commercial purposes. The community therefore moved in 1814 to Indiana, where it acquired 30,000 acres on the Wabash River. Here was built the town of New Harmony, and the settlement entered into agriculture and manufacture on a larger scale. Owing to the scarcity of currency, distance from the Eastern markets, and unfriendliness of the neighbors (being Abolitionists in sentiment, disagreeable elements from Kentucky, only 15 miles away, caused them much annoyance), Frederick Rapp (1824) purchased a tract of 3000 acres on the Ohio River, 18 miles below Pittsburgh. To this, their last home, they moved forthwith; selling in the meantime their Indiana property to Robert Owen. They named the last town Economy. Here, under the business acumen and efficient management of Frederick Rapp, they enjoyed such prosperity that by 1829 they dominated the trade and the markets of Pittsburgh and down the Ohio River. They were attacked as a monopoly, and it was advocated that the society be dissolved by the State. At this time the community was not neglectful of matters pertaining to art and culture. Frederick Rapp purchased and installed a museum, containing fine paintings and many curios and antiquities; they had a deer park, a floral park, and a maze, or labyrinth; they also had a good orchestra, were fond of music, and gave much attention to its cultivation. In 1832 the society suffered a serious division. Of 750 members, 250 became alienated through the influence of Bernhard Mueller (self-styled Count de Leon), who, with 40 followers (also at variance with the authorities in the old country), had come to Economy to affiliate with the society. Rapp and Leon could not agree; a separation and apportionment of the property were therefore agreed upon. This secession of one-third of the society, consisting mostly of the flower of young manhood and young womanhood, broke Frederick Rapp's heart. He died within two years. It resulted, also in the practical destruction of the community. The cotton, woolen, and silk factories continued in operation for a time in a desultory way and gradually closed altogether. After Rapp's death, in 1834, the management passed successively into the hands of George Rapp, who died in 1847; R. L. Baker and Jacob Henrici, 1847–69; J. Henrici and Jonathan Lenz, 1868–92; J. S. Duss, 1892–1903; Susie C. Duss, 1903–06. The high-water mark of the society's prosperity was at the close of the administration of R. L. Baker in 1868; its wealth at that time being probably $2,000,000. By 1890, however, it was hopelessly in debt, on the verge of bankruptcy, with a depleted membership of aged people. The society was overwhelmed with litigation on the part of would-be heirs. Disaster was averted by the efforts of J. S. Duss. He finally won the lawsuits and paid the society's indebtedness. The great strain which he had undergone undermining health, he was forced to resign his trusteeship in 1903. There being but few members left, the society was formally dissolved in 1906. Consult: Aaron Williams, *The Harmony Society at Economy, Pennsylvania, Founded by George Rapp, A.D. 1805* (Pittsburgh, 1876); Nordhoff, *Communistic Societies of the United States* (New York, 1874); Alfred Hinds, *American Communities* (rev. ed., Chicago, 1902); Bole, *The Harmony Society* (Philadelphia, 1904); J. S. Duss, *George Rapp and his Associates* (Indianapolis, 1914).

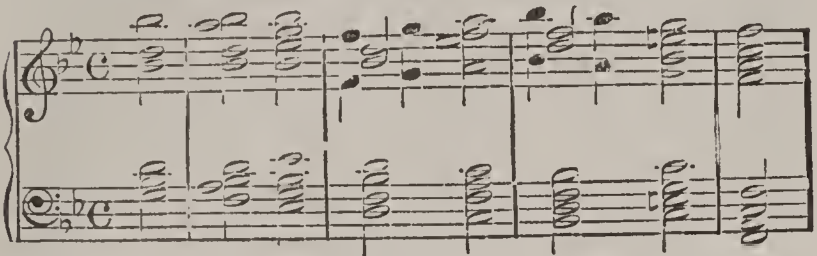
HARMO'NIUM (Neo-Lat., from Gk. *ἁρμόνιος*, *harmonios*, harmonious). A reed organ with bellows which are operated by the feet of the performer. The tone is produced by free vibrating reeds. The harmonium is a development from the older regal (q.v.). In 1810 Grenié exhibited the first harmonium, which he called *orgue expressif*, because this instrument was capable of greater expression as well as of producing a crescendo and diminuendo. A. Debain, of Paris, improved it, and first gave it the name of harmonium when he patented his instrument in 1840. A complete revolution in the construction of the harmonium was begun in America when a mechanic who had worked in the factory of Alexandre in Paris emigrated to America. This man conceived the idea of a suction bellows, instead of the ordinary bellows which forced the air outward through the reeds. The firm of Mason and Hamlin, of Boston, in 1860 made their instruments with the suction bellows, and this method of construction soon superseded all others. Consult Mustel, *L'Orgue expressif ou l'harmonium* (Paris, 1903).

HAR'MONY (Lat. *harmonia*, Gk. *ἁρμονία*, harmony). The science which treats of chords, their structure, relation, progression, and resolution. As such it forms to-day the fundamental branch of the science of musical composition. All tones are regarded as elements of some fundamental chord, and for this reason the voices lose much of their individual freedom which they have in counterpoint, but are regarded more as affecting the relations of successive chords. As taught to-day, harmony comprises the study of intervals, chords, their structure, inversions, and chromatic alterations; progression of the various voices; suspensions, anticipations, and passing notes; modulation. Harmony, in our acceptation of the term, was unknown to the ancients. Only in the tenth century did a Flemish monk, Hucbald, conceive the idea of setting a second voice a fifth below the original cantus. This crude experiment was the beginning of harmony. In the sixteenth century Zarlino, in his great work *Istituzioni harmoniche*, established the consonance of the third and also discovered the polarity of major and minor. This means, he proved that the major scale is essentially an *ascending* scale with semisteps between 3–4 and 7–8; whereas the minor scale is essentially *descending* with the semisteps in the identical places. In other words, one is the exact counterpart of the other. Therefore, in major all intervals are determined *upward*, in minor *downward*. (See MINOR.) That this discovery did not bear fruit immediately is due to the invention of figured bass, which determines all intervals from the *bass* tone instead of the *fundamental*. Tartini, in the eighteenth century, tried to develop Zarlino's ideas, but failed because he could not get away from the theories of figured bass. Thus, the idea of the polarity of major and minor fell into oblivion, until in 1853 Moritz Hauptmann (q.v.) established this relation on a firm scientific basis. But after the third was once recognized as a consonance, the basis for the construction of chords was given. Still, music could not free itself from the fetters of the Church modes (q.v.). Hence the development of music took place along the lines of polyphony (q.v.), or contrapuntal writing. Only after the establishment of the major and minor modes in place of the Church modes, and the subsequent introduction of equal temperament (q.v.), which rendered modulation into all keys possible, could music develop harmonically. Thus, Bach, while marking the highest development of the polyphonic contrapuntal style, at the same time marks the beginning of homophonic harmonic writing. Since then the progress of harmony has been very rapid. Progressions that startled one generation by their dissonance and boldness were accepted as pleasing and natural by the next, until, in the works of the great masters of the nineteenth century, we have a wealth and variety of harmonies that their predecessors never dreamed of. To-day all music is conceived as resting upon a *harmonic* basis. All tones are regarded on the basis of consonant chords, so that dissonant chords are conceived not as independent formations, but as modifications of a fundamental consonant chord. That this view is the only rational one and rests upon a natural basis is conclusively proved by the fact that the works of the greatest writers of the polyphonic style can all be reduced to a simple harmonic basis.

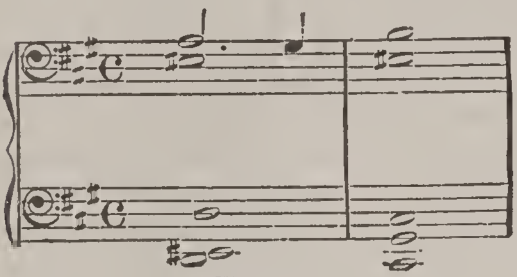
The importance of harmony in modern music cannot possibly be overestimated. Emotional expression depends almost entirely upon the choice of harmonies. The same melody harmonized differently is capable of expressing widely different moods and emotions. This is strongly illustrated by the leading motives in the works of Wagner. The same melodic phrase occurs frequently in a different harmonic garb in accordance with the varying demands of the dramatic situation. The development sections of Beethoven's symphonies and sonatas afford innumerable examples of wonderful and surprising effects produced by different harmonization of the original themes. Simple folk songs can be invested with a transcendent beauty by a judicious, refined harmonization. The works of Brahms, Dvořak, Grieg, and the modern Russian composers furnish abundant examples of this. It is highly interesting to compare the many harmonic settings of Luther's famous hymn, *Ein* *feste Burg ist unser Gott.* Bach's wonderful setting cannot be surpassed (Ex. 1); and yet what a different character does Wagner impart to this simple melody when he introduces it in his *Kaisermarsch* (Ex. 2). The three notes constituting the melodic outline of the motive of Fate in the Nibelungen are surely insignificant enough in themselves. This motive derives its solemn and majestic character solely from the rich underlying harmony (Ex. 3). One more example to prove the importance of harmony. The principal theme of the allegretto in Beethoven's A major Symphony is nothing but a rhythmic figure to which the name of melody can scarcely be applied. Yet, by means of the most marvelous harmonic combinations, the master has transformed it into one of the most impressive and deeply emotional phrases to be found in the whole range of music (Ex. 4).



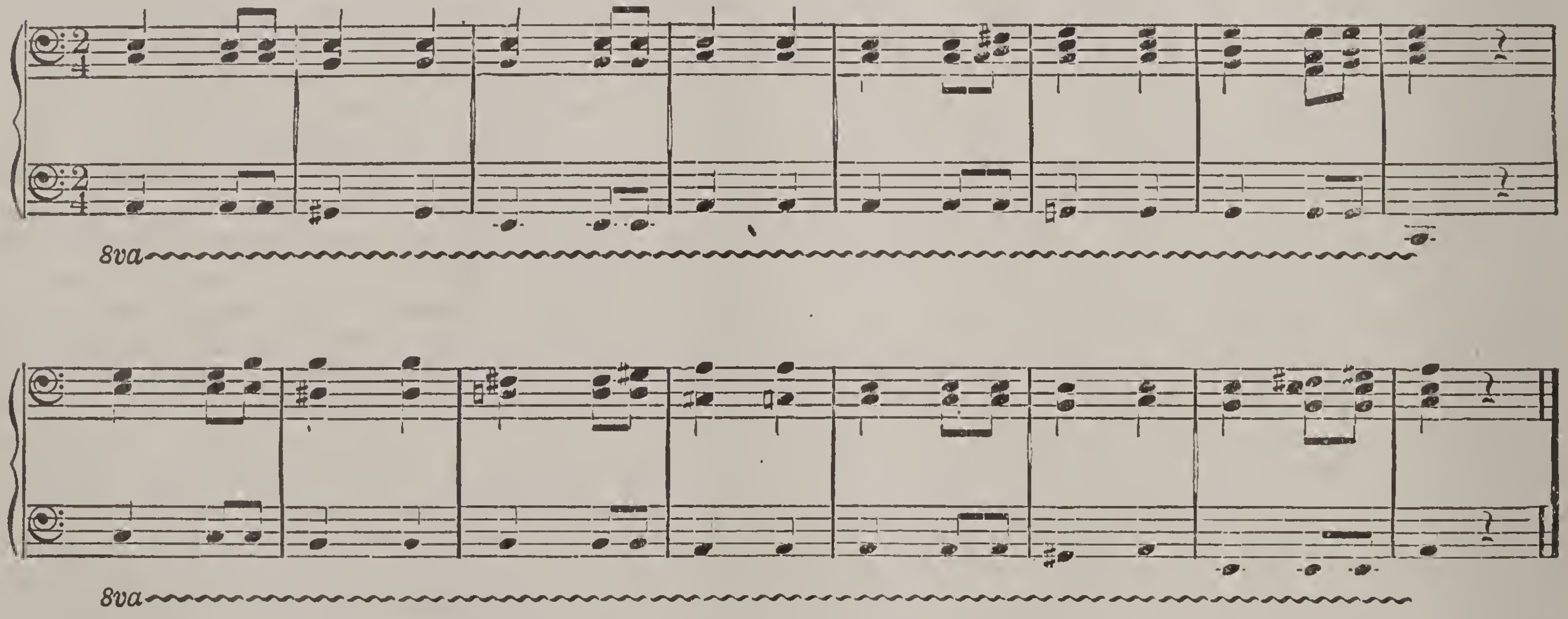
Ex. 1.



Ex. 2.



Ex. 3.



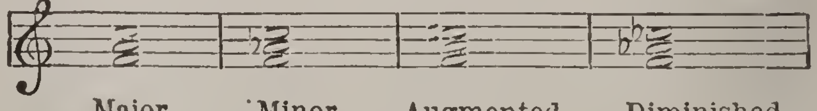
Ex. 4.

In the great masters the gift of harmony is inborn. Wagner expressly declares that no melody ever occurred to him apart from its harmonic basis. Yet a talent for harmony can be cultivated to a certain extent. Every thorough musician is capable of harmonizing a given melody in several ways. Besides the choice of the chords there is another important factor, viz., the proper distribution to the different voices of the different tones composing a chord. This has to do with the leading of the voices and the rules to be observed in correct writing. It cannot be the object or purpose of an article like the present to attempt a technical exposition of so broad a subject as harmony. The following is therefore intended to give the general reader some idea of the scope and function of the various subjects comprised under the collective title of harmony.

Intervals. Under this heading the tones are treated in respect to the distance or difference in the degree of the scale that separates them one from the other. If two tones are sounded simultaneously, they form *harmonic* intervals; if sounded successively, *melodic* intervals. All intervals are reckoned from the fundamental tone of the scale. When the same tone is sounded on two different instruments, the interval is called a *prime*, both tones being on the same degree of the scale. The tone upon the second degree forms the interval of the second with the fundamental tone, and so on, until the eighth degree is reached, which is the same as the first, one octave higher. Generally all intervals are reckoned within one octave; thus, C-e^2 is a third, although the two tones are separated by more than three octaves. For theoretical purposes, however, the intervals of the ninth, tenth, eleventh, and twelfth are recognized. Intervals are classed as *consonant* and *dissonant*, and again as *major, minor, augmented, diminished*, and *perfect*. See INTERVAL.

Chords. Under this heading are treated the nature and formation of chords. The fundamental chord is the triad consisting of three tones, the prime, third, and fifth. According as the major or minor third is used, the chord itself is major or minor. The presence of an augmented or diminished interval renders the chord likewise augmented or diminished. All chords are constructed by means of thirds (Ex. 5). By adding the interval of a third to any triad a chord of the seventh is obtained, so called because the last added tone forms the

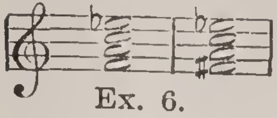
TRIADS



Major. Minor. Augmented. Diminished.

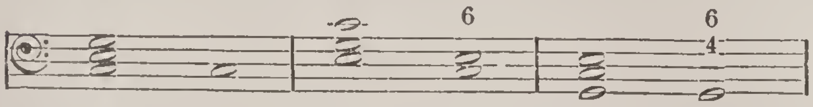
Ex. 5.

interval of a seventh with the fundamental tone of the chord (Ex. 6). All chords can be inverted; i.e., any tone of a chord can be in the bass, or lowest part. When the fundamental tone is in the bass, the chord is said to be in its fundamental position. With the third in the bass we obtain the first inversion; with the fifth in the bass we have the second inversion (Ex. 7). Chords of the seventh admit three inversions (Ex. 8). With respect to the relative position of the various tones composing a chord, a distinction is made between *close* and *open, spread* or *extended* harmony.



Ex. 6.

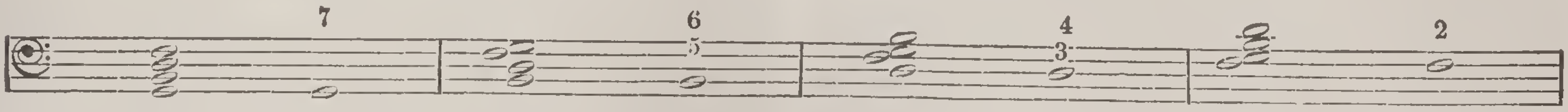
INVERSION OF TRIADS



Fundamental. First inversion. Second inversion.

Ex. 7.

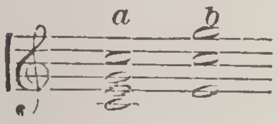
INVERSIONS OF CHORD OF SEVENTH



Fundamental. First inversion. Second inversion. Third inversion.

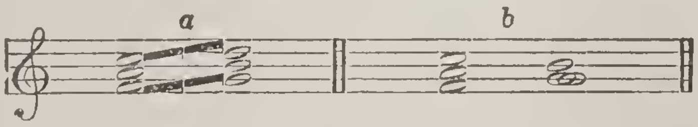
Ex. 8.

In Ex. 9 the first chord (*a*) is in *close* harmony because none of its tones can be transposed an octave and still fall within the other tones of the chord. The second chord (*b*) is in *open* harmony because, by transposing the E an octave, it falls between the tones C and G of the chord (Ex. 9). Likewise, transposing the G an octave lower, it falls between C and E.

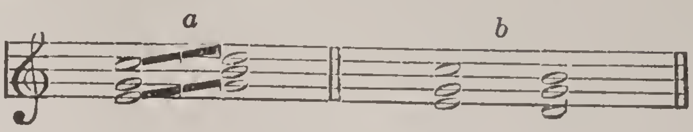


Ex. 9.

Progression of Chords. Each tone composing a chord is regarded as belonging to a distinct voice or part. The laws governing the progression of chords are exceedingly few and simple, yet it requires long and constant practice to acquire the art of leading the voices correctly. 1. Parallel octaves and fifths are strictly forbidden. This means that two tones of one chord forming the interval of an octave or a fifth must not progress in such a manner as to form the same interval in the next chord (Ex. 10). The example under (*a*) is bad because the progressions c-d and f-g produce fifths in both chords. The correct progression is given under (*b*). Octaves and fifths may be open or covered. They are open, as in Ex. 10 (*a*), when the forbidden intervals occur in both chords; covered when they occur only in the second chord as the result of parallel motion, as in the following (*a*, Ex. 11). These covered fifths can be avoided by leading the voices, as under (*b*). 2. The leading tone can never be doubled. As the leading tone always demands the progression of a semistep upward into the octave, it is clear that a doubling of this tone would necessitate the faulty progression of open octaves. 3. Chords must not progress so as to produce an inharmonic relation. This means that a tone of one chord cannot appear chromatically altered in the next chord, except in the same voice. For instance, if g appears in one chord in the tenor part, a g♯ or g♭ can be introduced in the succeeding chord *only* in the tenor part. In the following example the faulty progression under (*a*, Ex. 12) is corrected under (*b*). 4. The interval of the seventh is never to be doubled; neither is any augmented or diminished interval to be doubled, for all such intervals are dissonant, and hence are sufficiently prominent if they occur in only one voice. See Leading of Voices.



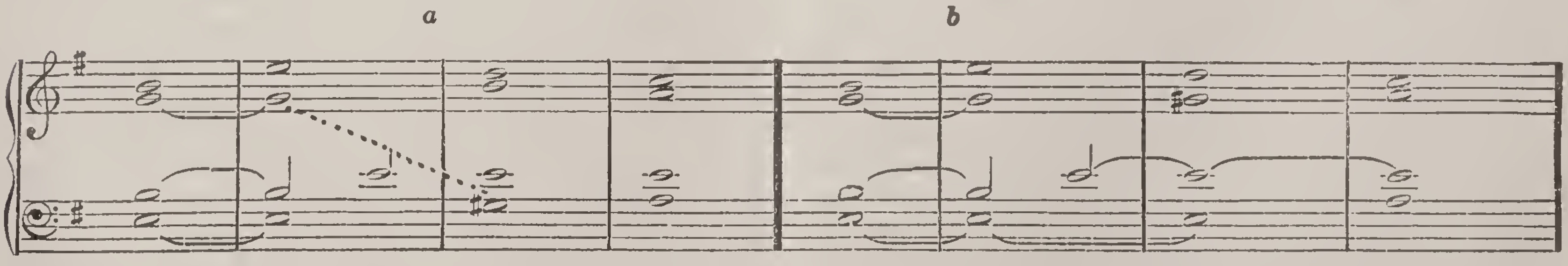
Ex. 10.



Ex. 11.

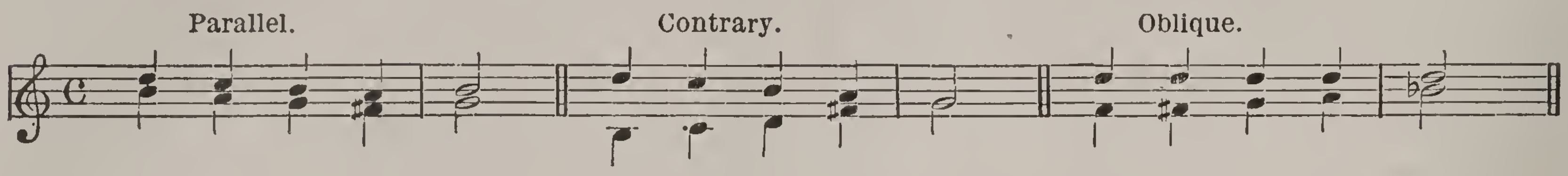
With respect to one another the different voices may proceed in *parallel, contrary,* or *oblique* motion. The motion is *parallel* if both voices either rise or fall together; *contrary* when one rises and the other falls; *oblique* when one remains on the same tone, while the other either rises or falls (Ex. 13). With respect to the number of voices employed, a distinction is made between two-part, three-part, four-part, etc., writing. The kind most generally used is the four-part. As a triad contains only three tones, it is evident that in four-part writing one of the intervals must be doubled. This is generally the fundamental tone, often also the fifth, seldom the third. In two-part writing some interval must be omitted and this is almost always the fifth. The number of parts is not restricted. There are compositions for as many as 24, and even 32 parts. Of course it requires absolute mastery to handle such a number of parts. See Motion (in music).

Anticipations, Suspension, Resolution. Tones may also appear in other chords than the ones to which they belong. When one or more voices proceed to tones of the next chord, while the remaining voices sustain the harmony of the first chord, *anticipation* occurs. *Suspension*

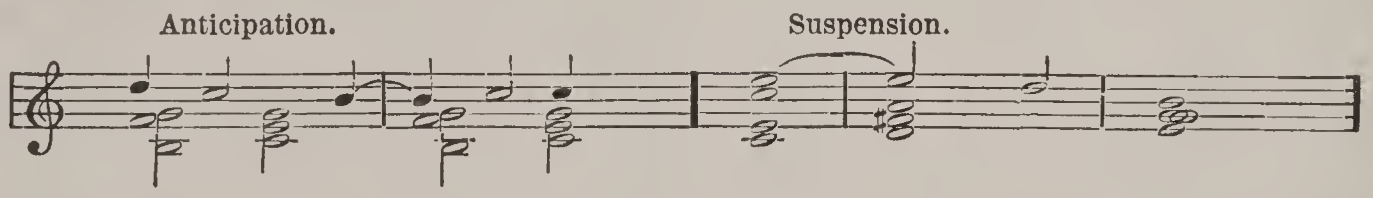


Ex. 12.

takes place when one or more voices hold the tone of the previous chord when the other voices have already proceeded to the harmony of the next chord. As the tones thus held do not belong to the chord with which they are sounded, they cause a dissonance. All dissonances require resolution into consonant chords. Anticipation occurs upon either the strong or weak beat of a bar; suspension only on the strong beat. Suspension, moreover, requires *preparation*, i.e., the tone suspended must occur in the previous chord as an essential element. The preparation takes place upon the weak beat, while the suspension itself occurs upon the strong beat (Ex. 14).

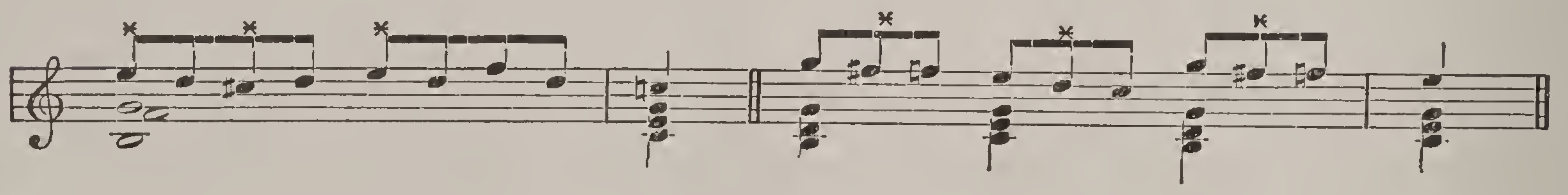


Ex. 13.

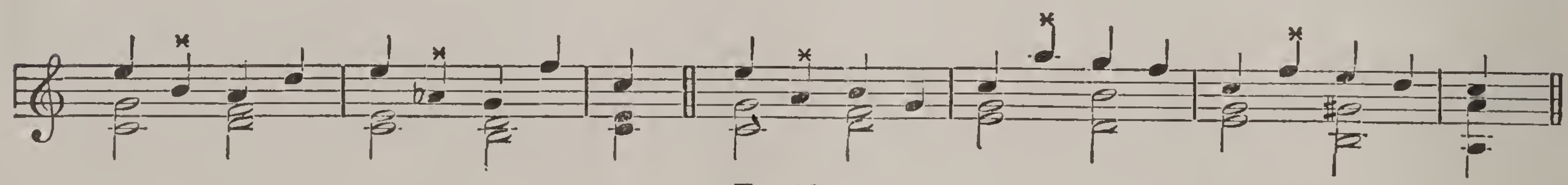


Ex. 14.

Passing Notes and Changing Notes. By passing notes are meant notes of short duration that do not affect the harmony, but only serve as a connective element between chords, as in Ex. 15 (passing notes marked*). A changing note is one that lies a second above or below a tone belonging to a chord. Whereas passing notes occur always in passages progressing by steps, changing notes generally proceed by skips, as Ex. 16 shows (changing notes marked*).



Ex. 15.



Ex. 16.

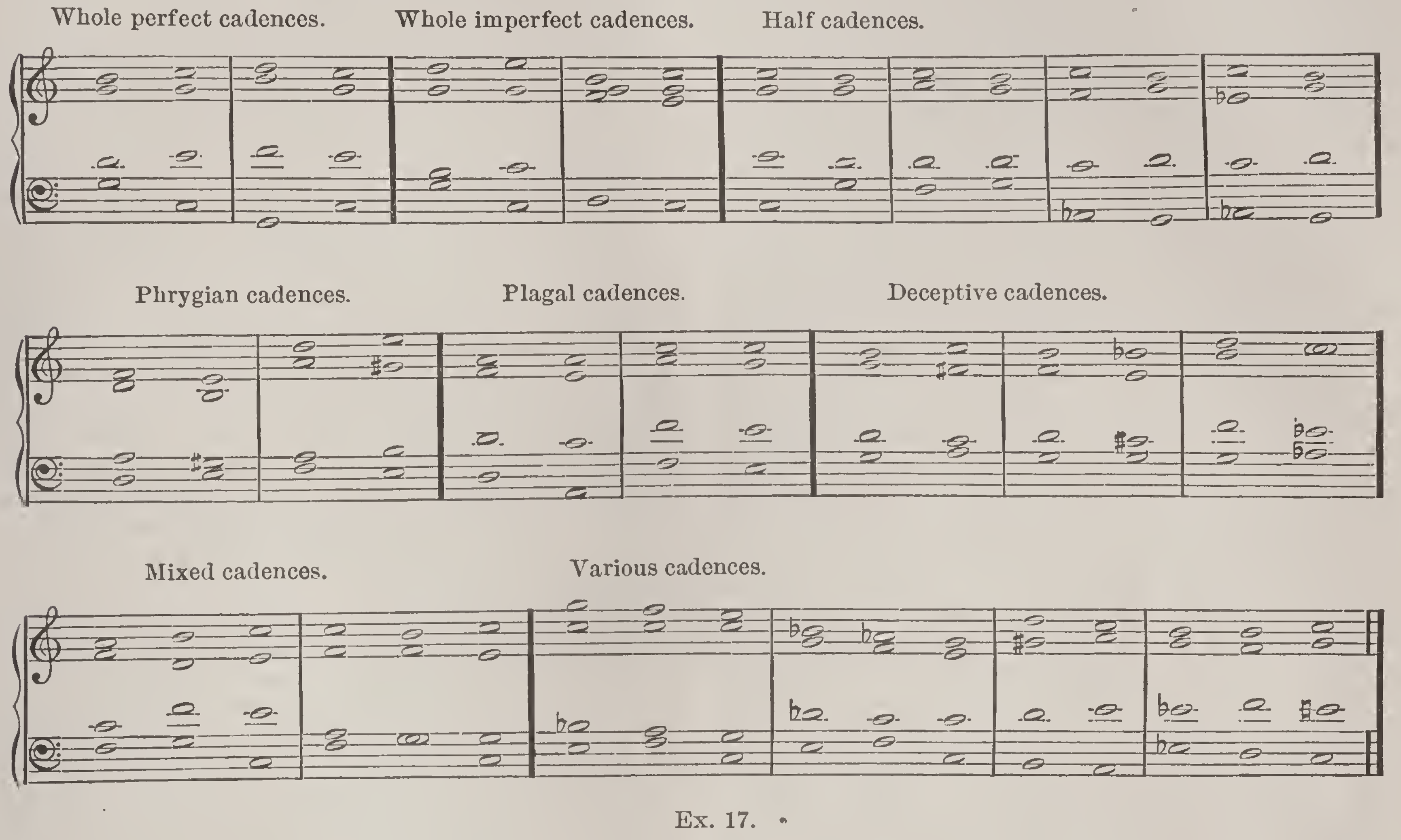
In the above examples only the soprano contains the passing and changing notes. It is possible, however, to have more or all voices move in notes of the same value as the soprano. The different tones of the different voices then form chords. All chords containing one or more of the notes marked* would then constitute *passing chords.*

Cadences. It is important to pay attention to the closing of a piece. The two principal cadences are the *authentic* and the *plagal.* The authentic cadence is the resolution of the dominant chord into the tonic. When the soprano has the fundamental tone of the tonic, and the bass the fundamental tone of both the dominant and tonic chords, the close is called a *whole cadence.* It is at the same time a *perfect cadence.* The *whole cadence* is *imperfect* when the soprano has any other interval than the fundamental of the tonic, or the bass any other than the fundamental tone of the dominant chord. A *half cadence* is the resolution of the tonic into the dominant chord, the reverse of the *whole cadence.* Instead of the tonic chord other triads may be used, especially those of the second, fourth, or sixth degree. A half cadence that occurs very frequently and is very beautiful is the *Phrygian cadence.* It consists of the resolution of the subdominant into the dominant in the minor mode. The *plagal cadence* is the resolution of the subdominant into the tonic chord. The cadences just mentioned are the ones most frequently used at the close of a composition. But at the end of a phrase or section a close known as the *deceptive,* or *interrupted, cadence* is frequently found. This consists of the resolution of the dominant into some chord other than the tonic. A *mixed cadence* is the succession of the subdominant, dominant, and tonic chords, thus constituting a mixture of the authentic and plagal cadences. Besides the cadences enumerated, others not specially classified also occur. Thus, the chord of the diminished seventh sometimes takes the place of the dominant or subdominant (Ex. 17).

Modulation. Although every composition is written in a certain key, wearisome monotony would result were the composer to restrict himself only to chords properly belonging to that key. Chords belonging to other keys are introduced with more or less frequency. Every such departure from the original key is a modulation. To modulate with artistic effect, the relation of the keys and the chords belonging to each must be thoroughly understood.

While pursuing the study of harmony, the student at the same time is trained in the science of figured bass. It is the rule followed in all modern treatises on harmony to write out the exercises in figured bass notation. This indicates the choice of chords, whereas the leading of the voices and the distribution of the tones are left to the student. Every great master has widened and enriched the field of harmony. While the theorists have speculated, groped in the dark, and often formulated arbitrary *rules,* which have nothing to do with the unchangeable fundamental *laws,* genius intuitively worked in accordance with laws. Of course there resulted the inevitable clash between *rules* and *laws;* hence that violent opposition in the past of theorists against contemporary genius. In this respect the influence of Wagner has had far-reaching consequences, and set the pendulum swinging to the other extreme. To-day a composer may dare anything and yet be sure of an enthusiastic following. Since the beginning of the present century Richard Strauss and Debussy (with their followers) have been the two principal causes of a really wonderful advance in harmonic combinations. Modern theorists, instead of condemning the new because it seems to run against accepted theories, have approached the innovations in a spirit of intelligent sympathy and discovered the difference between *rule* and *law.* They have found that the laws of harmony are few, simple, and universally valid. And, strangest of all, these laws and immutable principles were discovered centuries ago; but the inability of theorists to perceive the simple truth caused these valuable discoveries to fall into utter oblivion. Zarlino's discovery, published in 1558, has already been referred to. Rameau in 1722 declared that the simplest melodic phrase ought always to be conceived as a harmonic progression of chords; that all dissonant chords bear a relation to some consonant chord of which they are only modifications; that there can be only three fundamental harmonic functions—those of the Tonic, Dominant, and Subdominant—and that all modulation is merely interchange of these functions. Upon these simple principles the entire science of modern harmony is built.

In the last analysis the history of the development of harmony is the history of the development of the human ear in growing accustomed to dissonance (not discord). Every generation has progressed over its predecessor, and it seems that the end has not yet been reached. Debussy even goes so far as to maintain that, inasmuch as every single tone comprises within itself the entire scale as overtones (harmonics), there can be no dissonance; from which premises he argues further the nonexistence of tonality. It is not the function of this article to prove the fallacy—scientifically demonstrable—of such argument. If Debussy's claim were true, it would follow logically that his art must stand in the same relation to that of Bach, Beethoven, and Wagner as does theirs to the art of Hucbald.



Ex. 17.

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HARMONY OF THE SPHERES, or Music of the Spheres. It was a common belief among the ancients that the motions of the stars and planets produce a kind of music, which they called the harmony of the spheres. They attributed this music to the various proportionate impressions of the heavenly bodies on one another acting at proper intervals.

HARMONY, Preëstablished. See Preestablished Harmony.

HAR′MOST (Gk. ἁρμοστής, *harmostes*, joiner, adjuster, governor). A name given by the Spartans to the governors whom, after the Peloponnesian War, they sent into the towns subject to them, to keep the towns in subjection and to establish in them the form of government which obtained at Sparta itself. Even after the Peace of Antalcidas the Spartans kept harmosts in the towns which, by the terms of the peace, they had promised to set free. The harmosts frequently acted like kings or tyrants; Xenophon (q.v.), friendly though he was to the Spartans, condemns them for suffering the harmosts to govern as they did. It is thought that the harmost held office for one year.

HARMS, härms, Friedrich (1819–80). A German philosopher, whose concept of philosophy as the science of the absolute approaches Fichte. He was born at Kiel and educated there and in Berlin. In 1848 he was appointed professor of philosophy at Kiel and in 1867 at Berlin. His writings are critical and historical rather than constructive and, although marked by depth of thought, fail in clearness of style. Among them are: *Der Anthropologismus seit Kant* (1845); *Prolegomena zur Philosophie* (1852); *Die Philosophie Fichtes* (1862); *Schopenhauers Philosophie* (1874); *Die Philosophie seit Kant* (1877); *Ueber den Begriff der Wahrheit* (1876); *Die Formen der Ethik* (1878); *Metaphysik* (1885), *Logik* (1886), *Ethik* (1889), *Naturphilosophie* (1895), *Psychologie* (1897)—all edited by Wiese; and *Begriff, Formen und Grundlegung der Rechtsphilosophie* (1889).

HARMS, Klaus (1778–1855). A distinguished German theologian. He was born May 25, 1778, at Fahrstedt. In 1797 he went to the Gymnasium at Meldorf and in 1799 to the University of Kiel. After supporting himself as family tutor from 1802 till 1806, he was appointed deacon of Lunden, whence he was called in 1816 to Kiel, as archdeacon in the Nikolai Church. Next year, shortly before the tricentenary of the Reformation in Germany, he issued, in defense of Protestant orthodoxy, the 95 theses of Luther, together with 95 other theses "translated from 1517 to 1817" (Eng. trans. of most of them in *Lutheran Church Review*, 1889). These attacks on rationalism produced a deep impression throughout Germany and brought him a call to be Bishop of the consistory about to be instituted for the Protestant church of Russia. This, as well as a call in 1834 to succeed Schleiermacher in Trinity Church, Berlin, Harms refused. In 1835 he was made chief pastor and provost in Kiel, but was compelled to resign in 1849, because of almost total blindness. The rest of his life was spent in retirement, devoted to literary activity. He died in Kiel, Feb. 1, 1855. Harms's published works are chiefly sermons, which may be reckoned among the best specimens of modern pulpit eloquence in Germany. Of these, the most famous are his *Winterpostille* (1808; 6th ed., 1846) and *Sommerpostille* (1815; 6th ed., 1846), to which a new series was added—*Neue Winterpostille* (1826) and *Neue Sommerpostille* (1827). Consult: Dorner, *Blätter der Erinnerung an das Jubiläum von Harms* (Kiel, 1842); *Harms' Lebensbeschreibung verfasst von ihm selbst* (ib., 1851; 2d ed., 1852); and for his life, Kaftan (Basel, 1875); Lüdeman (Kiel, 1878).

HARMS′WORTH, Alfred Charles William. See Northcliffe, Baron.

HARMSWORTH, Harold Sidney, first Baron Rothermere (1868–). An English newspaper publisher, brother of A. C. W. Harmsworth, Baron Northcliffe, with whom he was associated. He was intimately connected with the territorial volunteer movement, endowed (1911) the Edward VII chair of English literature at Cambridge, in 1910 was created Baronet, and in 1914 was made Baron.

HARMSWORTH, Hildebrand (1872–). An English journalist, educated at Merton College, Oxford. In his teens he had gone into journalism with his brothers, Alfred (Lord Northcliffe) and Harold Harmsworth. He contested Gravesend in 1900 and Mid Salop in 1906, but had not the success of his brother Robert Leicester (born 1870), returned in 1900, or the other brother Cecil Bisshop (born 1869), returned in 1911. With the latter he edited the *New Liberal Review* (1901). Hildebrand Harmsworth joined Joseph Chamberlain's fiscal reform party in 1904. In 1907 he became proprietor of the *Globe*.

HARNACK, här′nȧk, Adolf (1851–). One of the foremost of modern Church historians. He was born at Dorpat, Russia, May 7, 1851, educated at the university there (1869–72), became privatdocent at Leipzig (1874), professor extraordinary of Church history there in 1876; ordinary professor of Church history at Giessen (1879), at Marburg (1886), and at Berlin (1889). A man of strong and inspiring personality, his lectures at Berlin were attended by hundreds of students from both Europe and America. His editorial activity was great, as is attested by the fact that from 1881 he edited with E. Schürer the *Theologische Litteraturzeitung*, a semimonthly critical review (Leipzig, 1876 et seq.), and from 1882 with O. von Gebhardt the *Texte und Untersuchungen zur Geschichte der altchristlichen Litteratur* (Leipzig, 1882–), a series of learned monographs to which he also contributed. He also joined Von Gebhardt and T. Zahn in bringing out *Patrum Apostolicorum Opera* (3 vols., Leipzig, 1875–77). But his fame chiefly rests upon his separate publications, some of which are: *Zur Quellenkritik der Geschichte des Gnosticismus* (1873); *Die Zeit des Ignatius* (1878); *Das Mönchtum* (1881; 5th ed., 1901; trans., *Monasticism: Its Ideals and its History*, 1895; with article on *The Confessions of St. Augustine*, 1901); *Martin Luther in seiner Bedeutung für die Geschichte der Wissenschaft und der Bildung* (1883; 3d ed., 1901); *Lehrbuch der Dogmengeschichte* (1886–90; 3d ed., 1894–97; Eng. trans., *History of Dogma*, 1895–1900); *Grundriss der Dogmengeschichte* (1889; 3d ed., 1898); *Das apostolische Glaubensbekenntniss* (1892; 27th ed., 1897; trans., *The Apostles' Creed*, 1901); *Geschichte der altchristlichen Litteratur bis Eusebius*: vol. i, *Die Ueberlieferung und der Bestand der altchristlichen Litteratur* (1893); vol. ii, *Die Chronologie der Litteratur bis Irenäus* (1897); *Das Christentum und die Geschichte*

(1895; 4th ed., 1897; trans., *Christianity and History*, 2d ed., 1901); *Das Wesen des Christentums* (1900; trans., *What is Christianity?* 1901); *Die Mission und Ausbreitung der Christentums* (1902; Eng. trans., *The Expansion of Christianity*, 1905); *New Testament Studies* (3 vols., 1907–09); *Constitution and Law of the Church in the First Two Centuries* (1910); *Bible Reading in the Early Church* (1912).

HARNACK, Axel (1851–88). A German mathematician, son of Theodosius Harnack (q.v.), and twin brother to Adolf Harnack. Born at Dorpat, he studied there (1869–73) and then at Erlangen and Munich. He was privatdocent at Leipzig in 1876, professor in the Polytechnic Institute at Darmstadt and then at Dresden. Besides several contributions to the *Mathematische Annalen* (vols. ix, x, xii, xiii, xiv, xvii, xix, xxi), he wrote: *Elemente der Differential- und Integralrechnung* (1881) and *Grundlagen der Theorie des logarithmischen Potentials und der Potentialfunktion in der Ebene* (1887). Consult the biography by Voss, in the *Mathematische Annalen*, vol. xxxii (Leipzig, 1894).

HARNACK, Theodosius (1817–89). A German Lutheran theologian, father of Adolf and Axel (qq.v.). He was born at St. Petersburg, Russia, Jan. 3, 1817, was educated at Dorpat and taught there (1843–53), at Erlangen (1853–66), Dorpat again (1866–75), when he retired. He died at Dorpat, Sept. 11, 1889. His specialty was practical theology, and he wrote *Liturgische Formulare* (1872–74), *Praktische Theologie* (1877–78), and other books in that department. His work was influential in Lutheran liturgics.

HARNED, här′nĕd, Virginia (1868–). An American actress, formerly the wife of E. H. Sothern, from whom she was divorced in 1910. She was born in Boston and when about 16 first became a member of a traveling company. Her New York début was in *A Long Lane* at the Fourteenth Street Theatre (1890). In 1895 she appeared as Trilby in Paul Potter's dramatization. Prominent among her subsequent parts have been Lady Ursula in *The Adventure of Lady Ursula* (1897); Ophelia, to Mr. Sothern's Hamlet (1900); Alice Rousillon in *Alice of Old Vincennes* (1901); and Iris in A. W. Pinero's play of the same name (1902). Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899), and William Winter, *The Wallet of Time* (2 vols., New York, 1913).

HARNESS. See Saddlery.

HAR′NESS, William (1790–1869). An English author and divine, educated at Harrow, where he formed a lifelong friendship with Byron, and at Christ's College, Cambridge (B.A., 1812; M.A., 1816). He entered holy orders and became known as one of the most eloquent preachers in London. By his efforts was built the church of All Saints, Knightsbridge (1849), of which he was perpetual curate till his death. Many of his sermons were published, but he is now remembered chiefly for his edition of Shakespeare (8 vols., 1825). Consult L'Estrange, *Literary Life of Harness* (London, 1871).

HARNESS CASK. A large wooden cask, commonly shaped like the frustum of a cone, flattened at the sides, and used on board ship for the temporary stowage of salt provisions which are intended for issue to the crew within a day or two. Sailors call salt beef *salt horse*, and of course a *harness* is the most natural thing to be around a horse—hence the name.

HAR′NESSED ANTELOPE. A bush buck of the genus *Tragelaphus*, so called because most of them have irregular stripings and spottings of white on a dark ground, suggesting a harness. Most of them belong to the jungles of West and South-Central Africa, and the list includes the bongo and guib (see Bush Buck), the nyala and sitatunga. See Colored Plate of Antelopes; Guib.

HAR′NETT, Cornelius (1723–81). An American patriot, born in Chowan Co., N. C. He served in the Colonial Assembly from 1754 to 1775, was an early and energetic opponent of the Stamp Act, was chairman of the joint Wilmington and New Hanover Committee of Safety in 1774–75, served in the Continental Congress in 1777–79, and signed the Articles of Confederation. He took an active part in the framing of the constitution of North Carolina, opposing the effort to secure the establishment of the Church of England as a part of the proposed government. In Congress he urged the importance of maintaining in the States effective military organizations for the national defense and of fortifying the seacoast. For his various activities he was proscribed by Governor Martin in 1775, while in the following year Sir Henry Clinton expressly excluded him (and Robert Howes) from his offer of amnesty proclaimed at Wilmington. Early in 1781 he was captured near Wilmington by British troopers under Major James H. Craige, who treated him with cruelty, confining him in a roofless blockhouse for several weeks. In consequence of this exposure he died soon after he had been paroled. Josiah Quincy, Jr., of Massachusetts, who met Harnett in 1773, while traveling in the South, styled him "the Samuel Adams of North Carolina." Consult Connor, *Cornelius Harnett* (Raleigh, 1909).

HAR′NEY, John Hopkins (1806–67). An American journalist, born in Bourbon Co., Ky. He graduated at Oxford University, Ohio, in 1827, was appointed professor of mathematics at the University of Indiana (1828) and Hanover College (1833), and then became president of a college in Louisville, Ky. (1839–43). He published an *Algebra* for school use in 1840. From 1844 until his death he edited, at Louisville, the *Democrat*, in which he vigorously denounced the arrest and deportation of citizens by the military authorities, when the State was invaded by Confederate troops. After the war he advocated conciliatory measures. In 1861 he was a member of the State Legislature.

HARNEY, William Selby (1800–89). An American soldier, born near Haysboro, Tenn. He entered the United States army and rose to be lieutenant colonel of dragoons in 1836. He served in the Black Hawk War, in the Florida War, and in expeditions into the Everglades, and during the Mexican War was brevetted brigadier general for gallantry at Cerro Gordo. In 1858 he was appointed to the command of the Department of Oregon and subsequently to that of the Department of the West. In 1861, while journeying to Washington, he was taken prisoner by Confederates and brought to Richmond. Upon his release he issued proclamations to the people of Missouri, describing the evils certain to follow from secession. He was retired in 1863 and in 1865 was brevetted major general. Consult Reavis, *Life and Military Services of Gen. W. S. Harney* (St. Louis, 1878).

HAROËRIS, hä′rô-ē′rĭs, or **HARUËRIS,** "Horus the Elder" (from *Hor*, *Horus* + *uêr*, great, adult). An Egyptian god. Originally he was merely a phase of the sun god Horus, representing the sun in summer, or taking the daily course as the type of the yearly, the sun at its full height, at noon. He is regularly represented as a hawk-headed king, wearing the two crowns of Egypt. Originally he was the son of Osiris and his sister Isis, conceived while his parents were in the womb of their mother, Nût (i.e., the sky). Later, however, when the two phases of the young and the adult sun were represented by two distinct deities, he became not only a brother of Harpocrates (q.v.), but even a brother of Osiris and son of Nût, the sky, and Seb (or Gêb?), the earth (Plutarch: Rhea and Kronos), while other inscriptions make him son of other forms of the old Sun (Rê, or Atum). He was specially the god of southern Egypt. See HORUS; HARPOCRATES.

HAR'OLD I, surnamed HAREFOOT (probably on account of his swiftness). King of England from 1037 to 1040. He is believed to have been the younger of Canute's two sons by his first wife, Ælfgifu. According to agreement on Canute's second marriage to Emma, widow of Ethelred II, his son by Emma was to inherit the English as well as the Danish throne; this son, Hardecanute (q.v.), was, however, in Denmark at the time of his father's death in 1035. Leofric, Earl of Mercia, favored the cause of Harold, while the powerful Earl Godwine espoused that of Hardecanute. Civil war was averted by a compromise, and the kingdom was divided. Harold took London, with all the provinces north of the Thames, while the possession of Wessex was given up to Emma for Hardecanute. She fixed her residence at Winchester and established her authority over her son's share of the kingdom. In 1037 the thanes and people of Wessex, disgruntled by Hardecanute's prolonged absence in Denmark, submitted to Harold, and he was crowned King of all England. He is said treacherously to have slain the Ætheling Ælfred, the younger of the two sons of Ethelred and Emma, whom he had invited to England. He died at Oxford, March 17, 1040. Consult: Freeman, *The Norman Conquest*, vol. i (New York, 1877); Oman, *England before the Norman Conquest* (ib., 1910); Hodgkin, *History of England* (London, 1906).

HAROLD II (c.1022–66). King of England in 1066. He was probably the second son of the powerful Earl Godwine. In 1045 Harold was Earl of East Anglia. In 1051, when Godwine fell into disgrace with Edward the Confessor, Harold raised troops in Ireland and plundered the English coast until reëstablished in his earldom. After his father's death, in 1053, Harold inherited the Earldom of Wessex and all his father's property and power and became the head of the National party, which sought to counteract the Norman influence at the court of Edward the Confessor. In 1063, with his brother Tostig, he invaded Wales and inflicted such a terrible chastisement on the inhabitants that the English frontier was safe from their raids for three-quarters of a century. It was probably in 1064 that he made his visit to Normandy and took an oath to assist William in obtaining the English crown. The common legend is that Harold was shipwrecked on the coast of Normandy and fell into the power of Duke William, who forced him to swear on a chest full of sacred relics that he would aid him in his design. On the death of Edward the Confessor, Jan. 5, 1066, the Witan (q.v.), in the exercise of its rights, set aside the claims of Edgar Atheling, the grandson of Edmund Ironside, and, ignoring the reputed bequest of the late sovereign in favor of the Duke of Normandy, elected Harold to fill the vacant throne. Duke William immediately asserted his claim, which was supported by Harold's brother Tostig, who had been dispossessed of his Dukedom of Northumbria, and Harald Haardraade, King of Norway, his ally. Tostig and the Norwegian King landed on the coast of Yorkshire and, after defeating Eadwine and Morkere, Earls of Northumbria and Mercia, advanced to York, but were met by Harold at Stamford Bridge and totally routed, Sept. 25, 1066. A few days later William landed in England; the contending armies met at Senlac, about 7 miles from Hastings (see HASTINGS, BATTLE OF), where Harold's defeat and death, Oct. 14, 1066, made the Duke of Normandy undisputed ruler of England. Consult: Freeman, *The Norman Conquest*, vols. ii and iii (Oxford, 1877); Green, *The Conquest of England* (London, 1883); Oman, *England before the Norman Conquest* (New York, 1910); Hodgkin, *History of England* (London, 1906). See ANGLO-SAXONS; ENGLAND.

HAROLD I AND **HAROLD III.** Kings of Norway. See HARALD.

HAROLD, OR THE LAST OF THE SAXON KINGS. An historical novel, founded on the life of Harold II of England, by Bulwer-Lytton (1848).

HAROUN AL-RASHID, hȧ-rōōn′ ȧl-rȧ-shēd′. See HARUN AL-RASHID.

HARP (AS. *hearpe*, Icel. *harpa*, OHG. *harpha*, Ger. *Harfe*, Lat. *harpa*, of unknown etymology). A musical stringed instrument, much esteemed by the ancients. In Egypt the figure of the harp is found delineated from the earliest ages in many different forms. The Celtic bards held the harp in the greatest honor. In the Highlands of Scotland the instrument has disappeared, but it is still in use in Wales, and to some extent it lingers in Ireland, where, from its former prevalence, it is adopted as a national symbol. During the Middle Ages the Irish harp (q.v.) excelled all others, and the Irish harpers were reputed the greatest masters of the instrument. The harp was used as an accompaniment to the psalms sung by the early congregations of Christians. The double harp—or, as it is also called, David's harp—is an instrument in the form of a triangle, with a sounding board and gut strings; it is always tuned in the principal key of the music, while the strings are altered to suit any modulations out of the key, by pressure of the thumb, or turning the tuning pins of certain notes. These defects led gradually to the invention of the pedal harp, which has seven pedals, by which each note of the diatonic scale, in all the different octaves, can be made a semitone higher. A celebrated harpist, Hochbrucker, in Donauwörth, invented the pedals in 1720; while J. Paul Velter, in Nuremberg, in 1730, added the piano and forte pedal. After numerous attempts at further improvements the harp at length reached a degree of perfection by the invention of the double-action pedal harp by Erard in Paris in 1820. By means of Erard's invention each string can be sharpened twice, each time a semitone; so that the C string may be C flat, its full length, C natural by the first movement of the pedal, and C sharp by the next movement. The double-action harp is tuned with all the pedals half-down and in the key of C natural. It has 46 or 47 strings and a compass of over six octaves from $_1$C-g^4. The music is written on two staves, exactly as for the pianoforte. The instrument is now found in all large orchestras. For producing beautiful arpeggio effects the harp has no rival. In the final scene of *Das Rheingold* (the entrance of the gods into Walhalla) Wagner employs no less than eight harps. At various times attempts have been made to construct chromatic harps, but the great number of strings has rendered such instruments impracticable. In 1798 Edward Light brought out his dital harp, an ingenious combination of harp and lute. In 1913 an American, M. A. Clark, patented a much-improved model of the old Irish harp. Consult: H. Panum, *Harfe und Lyra im alten Nordeuropa* (Leipzig, 1906); J. Snoer, *Die Harfe als Orchesterinstrument* (ib., 1898); W. H. Grattan-Flood, *The Story of the Harp* (New York, 1905). See IRISH HARP.

HAR'PALUS (Lat., from Gk. Ἅρπαλος) (c.330 B.C.). Kinsman and comrade of Alexander the Great. Made chief of the treasury in the expedition to Asia, he was found guilty of embezzlement. Alexander pardoned him and in 330 made him custodian of the immense Persian treasure at Ecbatana. After squandering enormous sums in the most reckless manner Harpalus fled to Athens (325) with 5000 talents, which he employed in purchasing the good will of leading citizens, among them, it is said, Demosthenes (q.v.). From Athens he went to Crete, where he was assassinated.

HAR'PER, JAMES (1795–1869). An American publisher, born at Newtown, L. I. In 1811 he removed with his brother John (1797–1875) to New York, where they learned the trade of printing and established the firm of J. and J. Harper, printing for booksellers and publishers. James Harper was said to be the quickest and best pressman in New York City, and the proof reading of John Harper had an equal reputation. They published on their own account from 1818 to 1833, when with two younger brothers, Joseph Wesley (1801–70) and Fletcher (1806–77), they formed the firm of Harper and Brothers. The keen business sagacity and sterling honesty of James Harper soon made the firm one of the largest and most respected publishing houses in the United States. He was notably successful with series of books grouped into so-called "libraries," covering topics ranging from juvenile fiction to the classics, and founded *Harper's Magazine* in 1850, which with the two publications suggested by Fletcher Harper—*Harper's Weekly*, established in 1857, and *Harper's Bazar*, established 10 years later—soon took high rank in the field of periodical literature. The series was supplemented in 1881 by *Harper's Young People*, afterward called *Harper's Round Table*. In 1913 *Harper's Weekly* was sold, and the *Bazar* had already changed hands. From 1844 to 1846 James Harper was mayor of New York City and was subsequently suggested for State Governor, but his distaste for public life led him to discountenance all efforts in his behalf. In March, 1869, he was thrown from a carriage and killed, and for many years after his death the business of the firm was conducted by younger members of the family. After the failure of the firm in 1899 it was entirely reorganized as a stock corporation, George Harvey (q.v.) becoming president in 1900. Consult J. H. Harper, *The House of Harper* (New York, 1912).

HARPER, JOHN MURDOCH (1845–). A Canadian educator and author. He was born at Johnstone, Renfrewshire, Scotland, emigrated to Canada, and graduated at Queen's University, Kingston. His success as the head of important schools in Nova Scotia and New Brunswick induced the government of Prince Edward Island to appoint him in 1877 superintendent of education for the province. Having declined this appointment, he later became principal of the Provincial Normal School at Charlottetown, in 1880 rector of the Quebec High School, and in 1886–1903 was inspector of superior schools for Quebec Province. For a time he was professor of mathematics in Morrin College, Quebec. For many years he was editor of the *Educational Record*, and he was also elected a vice president of the Quebec Literary and Historical Society and of the Dominion Education Association. He published many brochures and editions of textbooks.

HARPER, ROBERT ALMER (1862–). An American botanist. He was born at Le Claire, Iowa, and graduated from Oberlin College in 1886, and from the University of Bonn (Ph.D.) in 1896. He taught Latin and Greek at Gates College in 1886–88 and was professor of botany and geology at Lake Forest University (1891), professor of botany at the University of Wisconsin (1898–1911), and afterward professor of botany at Columbia. He became a member of various scientific societies and is known for his work on the physiology of lower plants and the cytology of the fungi.

HARPER, ROBERT FRANCIS (1864–1914). An American Assyriologist. Born at New Concord, Ohio, he graduated from the University of Chicago in 1883 and from Leipzig (Ph.D.) in 1886, taught at Yale (1886–88 and 1889–91), and was associate professor of Semitic languages and literatures at the University of Chicago (1892–1900), and then professor till his death. He went to Assyria for the University of Pennsylvania in 1888–89 and for the British Museum in 1891–92, directed an expedition to Babylonia in 1903–06, and in 1908–09 was director of the American School for Oriental Study and Research, in Palestine. He became a curator in the Haskell Oriental Museum in 1900, after 1907 edited the *American Journal of Semitic Languages*, and was associate editor of the *Biblical World* and of the *American Journal of Theology*. He published: *Assyrian and Babylonian Letters Belonging to the Kouyunjik Collections of the British Museum* (13 parts, 1892–1913); *Babylonian and Assyrian Literature* (1901); *The Code of Hammurabi* (1904).

HARPER, ROBERT GOODLOE (1765–1825). An American lawyer and politician, born near Fredericksburg, Va. He was early taken by his parents to South Carolina, and at the age of 15 served in the volunteer militia of South Carolina during Greene's last campaign against Cornwallis in the South. After the close of the war he entered Princeton College, where he graduated in 1785. The following year he was admitted to the bar at Charleston, S. C., and removed into the interior of the State to practice. He was an ardent Federalist and wrote and spoke in favor of the adoption of the Federal Constitution. After several terms in the State Legislature, he was, in 1795, elected to Congress, where he served until 1801. He was a fluent speaker and a ready debater, and his able advocacy of the measures of Washington and Adams won for him a high place in the councils of the Federalist party. In 1799–1801 he was the recognized leader of his party in the House. After the expiration of his Congressional term he removed to Baltimore, Md., where he married the daughter of Charles Carroll, of Carrollton, and became one of the leading lawyers in the country. He served in the War of 1812 as a major general in the Maryland militia. In 1803 he was the principal counsel for Judge Pickering in the impeachment proceedings brought against him, and in 1806, with Luther Martin and others, successfully conducted the defense of Justice Chase in his impeachment trial. He was elected United States Senator from Maryland in 1816, but resigned in the same year because of his candidature for the Federalist nomination for Vice President, which, however, he failed to obtain. He was one of the principal promoters of the scheme for the colonization of free negroes in Africa which resulted in the establishment of Liberia. He published: *Observations on the Dispute between the United States and France* (1797); *Letters on the Proceedings of Congress; Letters to his Constituents* (1801). A collection of his letters, pamphlets, and addresses was published under the title of *Select Works of Robert Goodloe Harper* (1814).

HARPER, William Rainey (1856–1906). An American Hebraist and educator. He was born in New Concord, Ohio, July 26, 1856, of Scotch-Irish ancestry. He graduated at Muskingum College in 1870 and in 1875 received the degree of Ph.D. from Yale. After teaching in the Masonic College, Macon, Tenn., and in the preparatory department of Denison University, Granville, Ohio, he became professor of Hebrew in the Baptist Union Theological Seminary in Chicago in 1879. While here he perfected a system of teaching Hebrew by correspondence. In 1886 he was elected professor of Semitic languages in the graduate faculty of Yale and in 1889 also professor of biblical literature. From 1885 to 1891 he served as principal of the Chautauqua College of Liberal Arts and in 1891 became principal of the Chautauqua system. In the last-mentioned year he was elected to the presidency of the newly founded University of Chicago, where he was also head professor of Semitic languages and literature. His published works include: *Elements of Hebrew* (2d ed., 1890); *Hebrew Vocabularies* (5th ed., 1890); *Hebrew Method and Manual* (1885); *Elements of Hebrew Syntax* (1888); *The Prospects of the Small College* (1900); *The Trend of Higher Education* (1905); “Amos and Hosea,” in *The International Critical Commentary* (1905). He was the founder and editor of several publications, among them *The Hebrew Student* and *Hebraica*, and was one of the editors of the *Biblical World*, the *American Journal of Theology*, and the *American Journal of Semitic Languages and Literature.* For a picture of the Memorial Library erected in his honor, see Plate of Chicago University.

HARPER’S FERRY. A town in Jefferson Co., W. Va., 56 miles northwest of Washington, on the Baltimore and Ohio Railroad and the Chesapeake and Ohio Canal (Map: West Virginia, G 2). Its site, in a valley formed by Bolivar, Maryland, and Virginia (or Loudoun) Heights, and at the confluence of the Shenandoah River with the Potomac, is one of remarkable beauty. The town is the seat of Storer College (Free Baptist), a normal school for negroes, contains a high school, and has pulp and paper mills. Pop., 1890, 958; 1910, 706.

Harper’s Ferry is chiefly notable from its connection with the raid of John Brown (q.v.), who at the head of 18 men seized the armory here on Oct. 16, 1859, and held it until captured on the following day by United States troops under Gen. Robert E. Lee. On April 18, 1861, immediately after Virginia had seceded from the Union, the small Union garrison, consisting then of only 45 men under Lieut. Roger Jones, on the approach of a greatly superior force of Virginians under Gen. John Kenton Harper, abandoned the place and fired the Federal arsenal, destroying about 20,000 rifles and pistols and other property. The Confederates then gathered here a considerable force, which was first under Colonel Jackson, later known as “Stonewall” Jackson, and afterward under Gen. Joseph E. Johnston, both of whom energetically drilled and organized their troops. Johnston withdrew on June 15 and soon afterward another Union force took possession. The existence of a garrison here in September, 1862, compelled General Lee to divide the army of invasion which he was about to lead into Pennsylvania, and on the 15th General Jackson, after a prolonged bombardment, captured the place, securing about 12,500 prisoners and considerable material of war. Consult Johnson and Buel (eds.), *Battles and Leaders of the Civil War*, vols. i and ii (New York, 1887).

HARPES, här′pēz (Neo-Lat., from Gk. ἅρπη, *harpe*, a sickle). This curious group of trilobites is very unlike other forms in that it exhibits a number of decidedly larval characters, notably in the head, which remains through life larger than the thorax and pygidium, and alone among all the trilobites bears functional visual spots, or ocelli, on the fixed cheeks. The great number of free segments is also a primitive feature. The head, or cephalon, with its broad crescent-shaped, pitted, marginal expansion, or limb, and the small prominent glabella from which the eye lines extend at right angles to the ocelli, presents a strange aspect. The group as represented by the genus *Harpes* in its old conception extends from the Ordovician to the Devonian. Lately the Ordovician forms have been separated under the name “Eoharpes,” mainly on differences in the outline of the hypostoma. The most striking forms have been found in the Paleozoic rocks of Bohemia, *Harpes ungula* being the best known of them; but the genus is also represented in the Ordovician beds of Canada and the eastern United States. See Trilobite.

HARPIES. See Harpy.

HARPIGNIES, är′pē̇′nyē̇′, Henri Joseph (1819–1916). A French landscape painter. He was born at Valenciennes. He was a pupil of Achard in Paris and made his début in the Salon of 1853. His first picture which commanded attention was “The Edge of a Wood on the Banks of the Allier” (1861). Harpignies was at first but little appreciated, but his seriousness of purpose, love of nature, and force of drawing at length told on both artists and public. His landscapes evince a fine sense of the structure of the land, and many of his pictures are noted for the justice of their retreating planes. His foreground and distances sustain frankly their relative positions on his canvases. He was Commander of the Legion of Honor and received several gold medals, among them the medal of honor at Paris in 1897. Among his oils are “View of Capri” (1855); “A Storm” (1859);

"Evening in the Campagna" (1866), in the Luxembourg Museum; "The Valley of Egérie" (1870), a decorative panel for the Opéra; "Le Saut du Loup" (1873), a view on the Allier, and "Moonrise" (1884), both in the Luxembourg; "Banks of the Sarthe" (1892), "Banks of the Rhone" (1897), and "Moonrise," in the Metropolitan Museum, New York. Harpignies is an able technician in water color in such works as "Garden of the Villa Medici," Rome; "Le Pont-Neuf," a bridge in Paris; "The Hour of the Wild Goose."

HARPOC′RATES, "Horus the Younger" (Lat., from Gk. Ἁρποκράτης, *Harpokratēs*). The name given by the Greeks to a form of the ancient Egyptian god Horus. The Egyptian name, *Har-pekhrod*, means 'Horus, the child,' in opposition to Haroëris (q.v.), 'the adult Horus.' Therefore this god is usually depicted as a naked babe sucking his finger and wearing the plaited side lock, the sign of youth, at the right side of his head. Sometimes an amulet in the shape of a heart hangs around his neck; he usually wears one or both of the crowns of Egypt. Often he is represented as sitting on or emerging from a lotus flower, the divine flower growing in the primeval, chaotic waters from which the sun god first arose. Whether he was originally conceived as the young sun rising in the morning, as the sun at the winter solstice, or as the sun appearing in the primeval abyss, cannot well be determined; all three views are maintained. In Greek times the two forms of Horus, Harpocrates and Haroëris, were so strongly differentiated as to become two distinct deities, so that Harpocrates was understood as a posthumous brother of the "elder Horus," of weakly, immature form. The Greeks added the strange misconception of taking Harpocrates for a god of reticence, explaining his gesture with the finger as a sign demanding silence. Together with the other divinities of the Osirian circle, Harpocrates became very popular at Rome; but the continued misinterpretations of his cult (from a god of reticence he became a giver of oracles by dreams, etc.) seem to have led to abuses, and his worship was forbidden in the consulship of Gabinius, though it became very popular again in the days of Pliny.

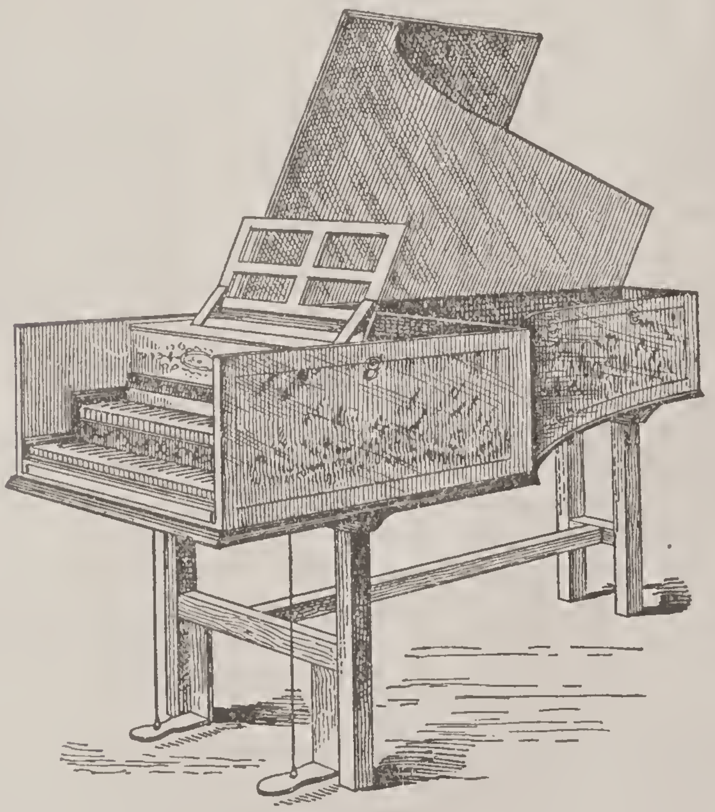
As a distinctive divinity, Harpocrates represents one of the youngest personalities of the Egyptian pantheon. He is often identified with *Har-sam-toui*, 'Horus, uniting both countries,' more rarely with Khonsu, Atum, etc. Harpocrates was worshiped at Denderah, Esneh, Thebes; he had seven differentiated forms at Hermonthis. See also Haroëris.

HAR′POCRA′TION (Lat., from Gk. Ἁρποκρατίων, *Harpokratiōn*), Valerius. A Greek grammarian and lexicographer of Egypt, respecting whose personal history nothing is known. Some have considered him to be the Greek instructor of the Emperor L. Verus mentioned by Julius Capitolinus in his life of that Emperor, while others suppose that he lived some time later, because several passages are found in his works taken from Athenæus, who is supposed to have flourished about 200 A.D. Harpocration is the author of a valuable lexicon to the 10 Attic orators, which contains much information on the antiquities and the general literature of Athens; this information includes notes on events and persons mentioned in the orators, explanations of legal expressions, etc. The value of this work is enhanced by the fact that all the authorities from which it has been compiled are lost. It was edited by Dindorf (Oxford, 1853). Harpocration is also the author of a lost work entitled *Collection of Flowery Extracts* (Ἀνθηρῶν Συναγωγή), ascribed to him by Suidas (q.v.). Consult Sandys, *A History of Classical Scholarship*, vol. i (2d ed., Cambridge, 1906).

HARP SEAL, or Saddleback. A hair seal of the North Atlantic (*Phoca grœnlandica*), which wanders widely, but usually is numerous off the coasts of Greenland and southward to Newfoundland, gathers in herds about the ice floes, and is slaughtered by sealers in great numbers. It is yellowish white when fully adult (when the males have a black head), with an irregular circle of dark marks on the back, inclosing a space which somewhat resembles a harp or a saddle. To the Eskimos these seals are of value for food, and summer clothes as well as tents are made of the skins.

HARP SHELL (so called because the ribbing of the shell resembles the strings of a harp). A gastropod mollusk of the family Harpidæ, having the last whorl of the shell very large, the shell ribbed longitudinally, the foot of the animal very large. The species, which are not very numerous, are found in the warmer seas and particularly at Mauritius. The shells are much prized for their great beauty, but must be kept in drawers and not exposed to light, or their delicate and brilliant colors will fade.

HARPSICHORD, härp′sĭ-kôrd (OF. *harpechorde*, from *harpe*, harp + *chorde*, chord, cord). A keyed musical instrument, formerly in extensive use, but now little known. In shape it was exactly like a grand pianoforte, to which its internal arrangements were also similar. The sound from the strings was produced by a small piece of crow-quill, or a piece of hard leather, which projected out of a slip of wood, called the jack, that stood upright between the strings and was pushed upward by the key till the quill, or leather, twitched the string, causing a brilliant but somewhat harsh sound, deficient of any means of modification in respect to loudness or softness. Specimens of the harpsichord, although now becoming quite rare, are still to be found in good preservation, but rather as articles of virtu or curiosity than as useful musical instru-



HARPSICHORD.

ments. Many Italian and Dutch harpsichords were highly ornamented by the most eminent artists with valuable oil paintings on the inside of the lid. The date of the invention of the harpsichord is uncertain. Before the fifteenth century there is no trace of its existence. It was introduced into England early in the seventeenth century. In the eighteenth century Kirkman, and later Broadwood and Tschudi, were the famous makers in London. After the invention of the pianoforte (q.v.) the harpsichord and all instruments of the same kind, such as the spinet, were in time entirely superseded. The harpsichord shown in the accompanying illustration was presented to Nelly Custis by George Washington. It was made in London, is 8 feet long, 3½ feet wide, and has two banks of 120 keys. Consult A. J. Hipkins, *Old Keyboard Instruments* (London, 1887), and F. W. Galpin, *Old English Instruments of Music* (Chicago, 1911).

HARPUT. See KHARPUT.

HAR′PY (Lat. *harpyia*, from Gk. Ἅρπυια, from the root of *ἁρπάζειν*, *harpazein*, Lat. *rapere*, to snatch). In Greek legend, a personification of the swift destructive wind storm, and hence also a symbol of death, a power carrying mortals off to sudden death. In this character they are found on Lycian graves, monuments, and elsewhere, carrying away the departed. In legend they are the daughters of Thaumas (the personification of the wonders of the sea) and Electra, and sisters of Iris. In Homer there is but one Harpy, *Podarge* (Swift-Foot), who by Zephyrus became mother of the horses of Achilles. In Hesiod two are mentioned Aello (Ἀελλώ, Storm-Swift) and Okypete (Ὠκυπέτη, Swift-Flying); they are winged goddesses, swifter than winds or birds. Later writers mention other names, as Celæno, who in Vergil, *Æneid*, iii, is their leader. The later writers also make them loathsome and filthy, bringing pollution to all that they approach. The Harpies appear in the Argonautic legend as sent by the gods to punish the blind Phineus, whose food they carry off. They were pursued by the winged sons of Boreas (Zetes, and Calais) to the Strophades islands in the Ægean, and either killed or, in the usual version, forced to promise to cease harassing Phineus. In the earlier art the Harpies are represented as winged human beings. Later they appear regularly with the head, breasts, and arms of a woman, but the claws, wings, and tail of a bird (so Vergil describes them). This is their form on the celebrated Harpy tomb from Xanthus in the British Museum. The Harpies have been regarded as the hostile spirits of the hot south wind, or as spirits of the storm who, at the order of the gods, carry off human beings alive to the underworld.

HARPY BAT. Two different kinds of bats are called "harpies." One is a genus of fruit bats (*Harpyia*), of which there are two species in the East Indies, one about 4 inches long, and the other much larger. The fur of both is pale buff in color, and both have the nostrils prolonged into divergent tubes, so that the genus is frequently called "tube-nosed." See Plate of BATS.

Another group of "harpy" bats is found in the insect-catching vespertilionine genus *Harpyiocephalus*, which is closely allied to our common North American bats. Though so far removed otherwise, this group agrees with the frugivorous genus (*Harpyia*) above mentioned, in having tubular nostrils—a remarkable similarity in two so divergent groups. These bats, of several species, inhabit India, the Malayan Archipelago, and Japan, and include one, the white-bellied harpy of the Himalayas, remarkable for its brilliant coloration, the fur being golden orange on the head, varying rust red on the back and outer surface of the membranes, and white on the chin, throat, and abdomen. All have large ears and numerous and very strong teeth, and they are believed to catch and crush beetles as well as to seize smaller insects.

HARPY EAGLE. A huge, crested bird of prey (*Thrasaëtus harpyia*), allied to the eagles and found in South and Central America and Mexico, occasionally coming as far north as the Rio Grande valley. See EAGLE, and Plate of EAGLES AND HAWKS.

HARPY TOMB. See XANTHUS.

HARQUEBUS, här′kwē-bŭs. See ARQUEBUS.

HAR′RADEN, BEATRICE (1864–). An English novelist, born at Hampstead and educated at Dresden, and in Cheltenham, Queen's, and Bedford colleges, finally taking her degree, with honors in classics and mathematics, at the University of London (1883). She traveled on the Continent and in 1894–95 visited the United States. She created a sensation in 1893 by her novel *Ships that Pass in the Night*. Among her other novels are: *In Varying Moods* (1894); *Hilda Strafford* (1897); *The Fowler* (1899); *Katharine Frensham* (1903); *The Scholar's Daughter* (1906); *Interplay* (1908); *Out of the Wreck I Rise* (1912).

HARRAN. See HARAN.

HARRAR, HARAR, hȧ-rär′, or **HURRUR.** The most eastern province of Abyssinia, bounded on the north and east by French Somali Coast and British Somaliland, and on the southeast and south by Italian Somaliland and British East Africa (Map: Africa, J 4). It is a plateau, reaching an altitude of about 11,000 feet. Nearly all the foreign commerce of Abyssinia passes through this province. (See ABYSSINIA.) Capital, Harrar (q.v.). Harrar belonged to the Anglo-Egyptian Sudan before the uprising of the Mahdi. It was ruled by an independent Emir from 1885 till early in 1887, when it was captured by Menelik of Abyssinia, from whom it was taken by the Italians in 1891; it became an Abyssinian province again in 1896, after the Italian defeat at Adowa.

HARRAR. The capital of the Province of Harrar in eastern Abyssinia, 184 miles south of the port Jibutil, with which it is connected by rail (Map: Africa, J 4). It is the second city of the country in importance, is surrounded by walls, and has a palace, one of the usual circular Abyssinian churches, and several mosques and barracks. It is situated in a fertile district which produces principally coffee. The commerce is growing and includes coffee, cotton, gum, ivory, and fruit, while the town itself carries on a lively trade in cattle, camels, and mules. Harrar is connected by telegraph and telephone with Addis Abeba and is the residence of several foreign consuls. Harrar was founded by the Arabs in the seventh century and ruled by native potentates till taken by the Abyssinians in the last decade of the nineteenth century. Its first European visitor was Sir Richard Burton, who went there in 1854. Pop. about 45,000 nearly all Harraris and Abyssinians. See HARRAR (province); ABYSSINIA.

HARRARIS, här-rä′rēz. The people of Harrar in Abyssinia. They are said to have been

Himyaritic Semites in race and were formerly Christians, speaking a dialect of Geez. Now the population is greatly mixed with Gallas and Somali, both of Hamitic stock. They are nearly all monogamists, allowing the women to go unveiled and relieving them of much hard work.

HARRIER, hăr′ĭ-ẽr. See HOUND.

HARRIER (from *harry*, AS. *hergian*, to ravage, from AS. *here*, Goth. *harjis*, OHG. *heri*, *hari*, Ger. *Heer*, army). The English name for the low-flying, meadow-haunting hawks of the subfamily Circinæ, called marsh hawks in the United States. See MARSH HAWK.

HARRIER EAGLE. See EAGLE.

HARRIES, hä′rē-ĕs, HEINRICH. The author of the Prussian national hymn, "Heil dir im Siegerkranz" (q.v.).

HAR′RIGAN, EDWARD (1845–1911). An American actor and playwright. He was born in New York City and as a young man had a somewhat desultory career, working as a calker in various cities, till finally, in San Francisco, about 1868 he made his appearance upon the stage. Soon afterward in Chicago with Anthony Cannon (Tony Hart) he won his first theatrical success, and in New York a little later his truthful and amusing sketches of local character were promptly appreciated. These sketches gradually developed into plays, interspersed with songs which were set to music by David Braham and have been whistled and sung all over the country. Among the best known of Mr. Harrigan's pieces have been the *Mulligan* series, *McSorley's Inflation*, *Old Lavender*, *Pete*, *The Major*, *Squatter Sovereignty*, *Reilly and the Four Hundred*, *My Son Dan*, and *Marty Malone*. The partnership of Harrigan and Hart lasted till 1884, after which Mr. Harrigan conducted theatres in New York and made tours in different parts of the country. One of his favorite rôles was that of George Coggswell in *Old Lavender*. For the season of 1903–04 he produced *Under Cover*. Consult McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896).

HARRI-KARRI. See HARA-KIRI.

HAR′RIMAN. A city in Roane Co., Tenn., 51 miles by rail west of Knoxville, on the Emory River, and on the Harriman and Northeastern, the Louisville and Nashville, the Southern, the Tennessee Central and the Cincinnati, New Orleans, and Texas Pacific railroads (Map: Tennessee, F 3). It is the centre of a region rich in coal, iron, timber, and agricultural lands, and has farm-implement works, a cotton mill, knitting mills, ironworks, a foundry and machine shops, a tannery, a flouring mill, planing mills, a metal-bedstead factory, and other industrial establishments. The city is the seat of the American University, founded in 1893, and of an industrial school for negroes, and contains a Carnegie library. Harriman was founded in 1890, and was granted a special city charter in 1891. The government, as provided by the revised charter of 1899, is vested in a mayor, chosen biennially, and a city council, elected on a general ticket. Harriman owns and operates its water works and electric-light plant. Pop., 1900, 3442; 1910, 3061.

HARRIMAN, EDWARD HENRY (1848–1909). An American railroad magnate and financier, born at Hempstead, N. Y., and educated in the public schools of Jersey City, N. J., and at Trinity School, New York City. When 14 years of age, he entered business as a brokerage clerk in New York, becoming a member of the Stock Exchange at 22. In 1872 he founded the banking and brokerage firm of Harriman & Co.; in 1883 was elected a director of the Illinois Central Railroad, and in 1887–90, as vice president of this road, first demonstrated his genius in railroad matters. In 1897–98, having gained control of the Union Pacific, with the aid of Kuhn, Loeb & Co., he proceeded to increase the road's efficiency greatly; and in order to extend it and prevent competition, he bought up the Central and Southern Pacific railways and the Oregon Railroad and Navigation Company, thus giving him an unobstructed path from Chicago to the Pacific coast. His unsuccessful attempt to wrest control of the Northern Pacific from J. J. Hill resulted in a serious Stock Exchange panic in May, 1901. Part of the funds used in this fight had been obtained by Harriman from the Equitable Life Assurance Society, of which he was a trustee; later his attempt to dominate the Equitable was thwarted by Thomas F. Ryan. Harriman's methods of financiering were perhaps best illustrated after he had come into control of the Chicago and Alton Railroad in 1901; $8,000,000 of old bonds and $22,000,000 of old stocks were converted into $54,000,000 of new bonds and $40,000,000 of new stocks; a 30 per cent dividend was declared soon after reorganization, and the bonds were taken by Harriman and others at 65 per cent and sold to insurance companies and savings banks at 96, thereby later causing the wreck of many of the smaller institutions. In 1906 the Interstate Commerce Commission began an investigation of the Harriman lines, the only practical result of which, aside from educating the public, was to demonstrate Harriman's well-nigh absolute power in the railroad world. His last great fight was in 1907, when he ousted his former friend, Stuyvesant Fish, from the presidency of the Illinois Central. In the field of politics Harriman used his influence freely in the affairs of California, and he contributed $225,000 for the Roosevelt campaign of 1904; but later, during an exchange of letters with President Roosevelt, he was referred to by the latter as "an undesirable citizen." At the time of his death Harriman controlled the Union Pacific, the Southern Pacific, the Southern Pacific and Mexico, the St. Joseph and Grand Island, the Illinois Central, the Central of Georgia, the Pacific Mail Steamship Company, the Portland and Asiatic Steamship Company, and the Wells Fargo Express Company. His great estate, estimates of which ranged from $200,000,000 to $600,000,000, was left entirely to his wife.

HAR′RINGTON, BERNARD JAMES (1848–1907). A Canadian educator, born at St. Andrew's, Province of Quebec, and educated at McGill and Yale universities, where he won high honors in natural science. Actively identified with the development of applied science courses at McGill, he was lecturer in chemistry and also chemist and mineralogist to the Geological Survey of Canada (1871–78); became (1883) Greenshields professor of chemistry and mineralogy, also lecturing on mining and metallurgy until 1891; and later was director of the Macdonald chemistry and mining building and Macdonald professor of chemistry. He was president of the Natural History Society of Montreal; for many years edited the *Canadian Naturalist*, later called the *Canadian Record of Science;* was elected fellow of the Royal Society of Canada and of the Geological Society of London; and in 1897 was vice president of the chemistry section at the Toronto meeting of the British Association for the Advancement of Science. His publications include *Notes on Dawsonite, a New Carbonate* (1882); *Life of Sir William Logan* (1883); *Notes on the Iron Ores of Canada and their Development* (1884); *Minerals of Some of the Apatite-Bearing Veins of Ottawa County, P. Q.* (1886); *The Sap of the Ash-Leaved Maple* (1887); *George Mercer Dawson* (1902).

HARRINGTON, Charles (1856–1908). An American educator and sanitarian, born at Salem, Mass. He studied at Bowdoin College (1873–74), graduated from Harvard University in 1878 and from Harvard Medical School in 1881, and studied for two years at Leipzig, Strassburg, and Munich. He was assistant in chemistry in 1883, assistant professor from 1893 to 1906, and for the last two years of his life professor of hygiene, at Harvard. From 1889 to 1904 he had charge of the bureau of milk inspection of the Boston Board of Health. In 1904 he became Secretary of the Massachusetts State Board of Health. For several years he was on the staff of the Boston *Medical and Surgical Journal.* He is author of the textbook *A Manual of Practical Hygiene for Students, Physicians, and Medical Officers* (1901; 3d ed., 1905).

HARRINGTON, James (1611–77). An English poetical writer, born at Upton, Northamptonshire. He entered Trinity College, Oxford (1629), but left without a degree and traveled on the Continent. Although a Republican, he was attached to King Charles I, whom, it is said, he accompanied to the scaffold. Resuming his earlier studies, he published in 1656 his famous political romance, *The Commonwealth of Oceana* (i.e., England). Harrington's main principle is that power rests upon property, especially landed property. He further argues that rulers should be elected by ballot for terms of three years. The work led to a lively controversy, in which Harrington took an active part. After the Restoration he was committed to the Tower on the charge of conspiracy. Weakened in mind by his imprisonment, he died insane, Sept. 11, 1677. His *Works* were edited by Toland (1700). Consult *Oceana,* in Morley's "Universal Library" (London, 1887), and Dwight, in the *Political Science Quarterly* for 1887.

HARRINGTON, Mark Walrod (1848–). An American astronomer and educator. He was born at Sycamore, Ill., was educated at Evanston, Ill., graduated at the University of Michigan in 1868, and was a member of the faculty there from 1868 to 1876, with an interval in 1870–71, when, as a member of the United States Coast and Geodetic Survey, he visited Alaska. He studied at the University of Leipzig in 1876–77, and in the latter year proceeded to China as professor of astronomy in the Cadet School of the Tsung-li-Yamen, or Foreign Office, in Peking. Ill health caused his return to the United States in 1878, and for a year he was professor in the Louisiana State University. In 1879 he was appointed professor of astronomy and director of the observatory at his alma mater, a position he held until 1891, when he was appointed Chief of the United States Weather Bureau at Washington. He resigned in 1895 to become president of Washington State University. In 1897 he retired to private life. He is the author of numerous scientific articles, pamphlets, and works, and until 1892 was editor of the *American Meteorological Journal,* which he founded in 1884. He wrote *About the Weather* (1899; 2d ed., 1909).

HAR'RIOT, or **HARIOT,** Thomas (1560–1621). An English astronomer and mathematician, born at Oxford. He acted for some time as tutor to Sir Walter Raleigh, who in 1585 appointed him surveyor to Grenville's expedition to Virginia. Harriot published an account of this expedition in 1588, and the work was afterward reprinted in Hakluyt's *Voyages.* On his return to England, after an absence of two years, he resumed his mathematical studies with zeal and success, but ill health prevented him from publishing his mathematical discoveries. He had an undoubted genius for algebra, as is shown by his *Artis Analyticæ Praxis ad Æquationes Algebraicas Nouâ Methodo Resolvendas* (London, 1631). In this treatise Harriot did for algebra in England what his friend Vieta had done in France—he put it on its modern basis. In the matter of symbolism he added the signs > and < to those which were just coming to be recognized as part of the universal language of algebra. He asserted the advantage, now fully recognized, of making the second member of an equation zero, although he did this only for particular cases, and he gave in substance the general theorem (often called by D'Alembert's name) that an equation of the *n*th degree has exactly *n* roots. Consult *Harriot Papers,* edited by Rigaud (Oxford, 1831). For his life, consult Stevens, *Thomas Harriot, the Mathematician, the Philosopher, and the Scholar* (London, 1909), and *Briefe and True Report of the New Found Land of Virginia* (facsimile, New York, 1903).

HARRIOTT, Mrs. F. C. See Morris, Clara.

HAR'RIS, Abram Winegardner (1858–). An American university president, born in Philadelphia. He graduated in 1880 (A.M., 1883) from Wesleyan University, where he was tutor in mathematics and registrar in 1881–84 and instructor in history in 1885–88. He taught mathematics at Dickinson Seminary, Williamsport, Pa., in 1880–81; was assistant director in 1888–91 and director in 1891–93 of the Office of Experiment Stations of the United States Department of Agriculture, and had charge of the Jacob Tome Institute, at Port Deposit, Md., in 1901–06. From 1893 to 1901 he served as president of the University of Maine, and after 1906 as president of Northwestern University. In 1910 he became chairman of the executive board of the Religious Education Association.

HARRIS, Sir Augustus Henry Glossop (1852–96). A noted English theatrical manager, lessee of Drury Lane, Covent Garden (the Opera), and other theatres. He was the son of Augustus Glossop Harris, who was also a well-known manager, and was born in Paris. In 1873 he made his début as an actor at Manchester and not long afterward became stage manager at Covent Garden. He leased Drury Lane in 1879. Besides his subsequent productions, especially of melodrama and opera, both there and at Covent Garden, which he took in 1888, he became joint author of a number of plays, most frequently in collaboration with Henry Pettitt; among them were *Pluck* (1882); *A Run of Luck* (1886); *A Million of Money* (1890); *The Prodigal Daughter* (1892). He was a member of the London County Council and was sheriff in 1891, when he was knighted. His death, which was ascribed to overwork, occurred at Folkestone.

HARRIS, Chapin A. (1806–60). An American dentist, born at Pompey, N. Y. In 1839 he procured the charter for the Baltimore Dental College, the first separate school of dentistry ever founded, and in 1839 established the *American Journal of Dental Science*, which he edited until 1858. Harris wrote: *Principles and Practice of Dental Surgery* (1839); *Diseases of the Maxillary Sinus* (1842); and a *Dictionary of Dental Science* (1849).

HARRIS, Corra May (White) (1869–). An American writer. She was born at Farm Hill, Ga., was educated at home, and married the Rev. Lundy Howard Harris (died 1910) in 1887. She began writing for the *Independent* in 1899 and contributed the "Brasstown Valley Stories" to the *American Magazine* in 1905–09. She also wrote: *The Jessica Letters* (1904), in collaboration with Paul Elmer More; *A Circuit Rider's Wife* (1910); *Eve's Second Husband* (1910); *The Recording Angel* (1912); *In Search of a Husband* (1913).

HARRIS, David Fraser (1867–). A Canadian physiologist, born in Edinburgh and educated at Edinburgh and Glasgow universities, where he won high honors in physics and physiology. He was assistant in physics and demonstrator in physiology at Glasgow (1893–98), lecturer in physiology at St. Andrews (1898–1908) and at the University of Birmingham, Thomson lecturer in natural science at the United Free Church College (1911), and after 1911 professor of physiology at Dalhousie University, Halifax, Nova Scotia. He was elected fellow of the Royal Society, Edinburgh, in 1908–09 was president of the Scottish Microscopical Society, was made a member of the council of the Nova Scotia Institute of Science, and in 1912 was appointed university representative on the Medical Council of Canada. His principal publications are: *The Time-Relations of the Voluntary Tetanus in Man* (1894); *The Reducing Power of Animal Tissues* (1907); *The Functional Inertia of Living Matter* (1908); *Colored Thinking* (1908); *Harvey as Histologist* (1909); *National Degeneration* (1909); *Sleep* (1910); *Plague* (1911); *Studies in the Reductose of Liver and Kidney* (1912); *Consciousness as a Cause of Neural Activity* (1913).

HARRIS, Frank (1856–). An English author and editor, educated at American and German universities. He taught, and practiced law, in the Middle West of the United States, and subsequently, returning to England, edited for a time, and successively, the *Fortnightly Review*, the *Saturday Review*, and the *Candid Friend*. He was credited with "discovering" Bernard Shaw and Max Beerbohm and turning the latter from musical to dramatic criticism. From 1871 to 1878 he lived in the United States and in 1913 returned there to lecture. His short stories are strong, impressive, and carefully constructed; their vigor, directness, and wide removal from popularity and conventionality of motive, sentiment, and point of view, give them, with their ironic and sardonic tendency, a genuine distinction. His short stories include: *Elder Conklin* (1894); *Montes the Matador* (1910); and *Unpath'd Waters* (1913). In 1885–86 Harris's careful investigation of the Chicago labor troubles (which culminated in the Haymarket Square Riot, q.v.) led him to a belief in the innocence of all but one of the Socialists executed as participants in a conspiracy; his vivid and impassioned realistic novel, *The Bomb* (1908), presents in the form of fiction a transcript of this tragic occurrence. In 1909 appeared his *The Man Shakespeare*, in 1911 *The Women of Shakespeare*. Both these books are valued by scholars as discriminating appreciations of aspects of Shakespeare's art, though distrusted in their specific contentions, notably in the attempt of the latter work to identify Shakespeare's mother, wife, daughter, and mistress as direct prototypes of various women of the plays of the great dramatist. In addition to the works above named should be mentioned *Great Days* (1914), a novel, and the plays *Mr. and Mrs. Daventry* (1900) and *Shakespeare and his Love* (1910).

HARRIS, Lord George (1746–1829). An English soldier. Born at Brasted, Kent, he was educated at Westminster School and at the Woolwich Military Academy. By 1765 he was lieutenant in an artillery regiment and in 1774 went as a captain to America, where he fought at Lexington, Bunker Hill, and in many other battles of the Revolutionary War up to 1778, when he went to the West Indies. He had suffered from serious wounds, capture by the French, and shipwreck before he entered on the second stage of his career, which was in India (1790–1800). There he distinguished himself in the campaigns against Tippu Sahib, commanded Fort William as major general, and was both civil and military governor of Madras. For his victory at Seringapatam, ending in the conquest of Mysore, Harris was promoted to be lieutenant general (1801). He was made general (1812) and a peer of the realm (1815), under the title Baron Harris of Seringapatam and Mysore. In 1824 he was made governor of Dumbarton Castle on the Clyde.

The fourth Baron Harris (George Robert Canning Harris) (1851–), who succeeded to the family title in 1872, was educated at Eton and at Christ Church, Oxford, and became known throughout the Empire as a cricketer. In 1885–86 he was Undersecretary of State for India, in 1886–89 Undersecretary of State for War, and from 1890 to 1905 Governor of Bombay.

HARRIS, George (1844–). An American college president. He was born at East Machias, Me., and graduated from Amherst College in 1866 and from Andover Theological Seminary in 1869. He served as pastor of the High Street Church, Auburn, Me., in 1869–72, and of the Central Church at Providence, R. I., in 1872–83. From 1883 to 1899 he was professor of Christian theology at Andover Theological Seminary and from 1899 to 1911 president of Amherst College. He is author of *Moral Evolution* (1896), *Inequality and Progress* (1897), and in 1884–93 was one of the editors of the *Andover Review*.

HARRIS, George Washington (1814–69). An American humorist, born at Allegheny City, Pa. He was a jeweler's apprentice and afterward captain of a Tennessee River steamboat, then a political writer for newspapers, and finally the creator of "Sut Lovengood," whose sketches and stories, written originally for newspapers (1858–61), appeared in book form as *Sut Lovengood's Yarns* (1867)—one of the raciest of Southwestern books of humor, ranking with J. J. Hooper's *Simon Suggs*.

HARRIS, Gilbert Dennison (1864–).

An American geologist. He was born at Jamestown, N. Y., and graduated from Cornell University in 1886. Between 1887 and 1893 he served on the United States, Texas, and Arkansas geological surveys, and he was assistant professor of paleontology and stratigraphic geology at Cornell from 1894 to 1909, and afterward full professor. He was also State geologist of Louisiana in 1899–1909. In 1895 he became proprietor and editor of the *Bulletins of American Paleontology*, and he published a reprint of Conrad's *Fossil Shells of the Tertiary Formations of the United States.* His investigations deal especially with the paleontology and stratigraphy of the Gulf Tertiaries and with the oil and gas of Louisiana.

HARRIS, Howel (1714–73). The principal founder of Welsh Calvinistic Methodism. He was born at Trevecca in Wales, was brought up in the Established church, and matriculated at Oxford in 1735. He was endowed with high oratorical powers, and his energy and enthusiasm carried his audiences by storm. He founded no fewer than 300 societies and formed a sort of Protestant monastery, in which there lived about 120 persons. Both Wesley and Whitefield were his friends and preaching companions. He raised a regiment at the time when a French invasion of England was confidently expected and moved about with his men, preaching in every encampment. His *Autobiography* was published in 1791. He also wrote *The Last Message and Testimony of Howel Harris, Esq., late of Trevecca in Wales, Found among Some of his Papers* (1774), and other works in Welsh. Consult David Young, *The Origin and History of Methodism in Wales and the Borders* (London, 1893).

HARRIS, Isham Green (1818–97). An American politician, born near Tullahoma, Tenn. After a very limited common-school education he engaged in business, studied law at night, and was admitted to the bar in 1841. He served in the State Legislature in 1847, was a Democratic member of the House of Representatives from 1849 to 1853, was elected Governor of Tennessee in 1857, and was reëlected in 1859 and 1861. At a special meeting of the State Legislature, called in January, 1861, to consider the condition of the country, he recommended that the question of calling a convention to take action for or against the secession of Tennessee be submitted to a popular vote, and asserted that in his view the existing evils could best be remedied by the adoption of amendments to the Federal Constitution favorable to slavery; and after the people decided on February 9 both in favor of the Union and against the calling of a convention, the secession majority in the Legislature on May 1 authorized him to enter into a military league with the Confederate States, to raise troops for State defense and to issue State bonds. On May 7 the League, which had previously been negotiated, was formally ratified by the Legislature. At the election held in June a large majority of the people voted in favor of secession and the representation of the State in the Confederate Congress, eastern Tennessee, however, remaining steadfastly loyal. In connection with the election charges of corruption and fraud were brought by the loyalist minority against the Governor and his friends. The Federal generals Grant and Buell soon gained virtual control of the State, Buell occupying Nashville with a considerable force, and in March, 1862, Harris fled to Mississippi. Soon afterward he joined the Confederate army and served as aid successively to Gen. A. S. Johnston, who died in his arms at the battle of Shiloh, and to other Confederate generals in command of the Army of the West. On March 3, 1862, President Lincoln appointed Andrew Johnson military governor of Tennessee, and Harris played no further part of any consequence in State affairs during the progress of the war. After the war he lived first in Mexico and then in England, but returned to Memphis in 1867, speedily regained his control of State politics, and was elected to the United States Senate in 1876, 1882, 1888, and 1894, where he was distinguished for his great powers as a debater. He served on important committees, acted as chairman of the Committee on the District of Columbia, and in 1893 was elected President pro tem.

HARRIS, James (1709–80). An English philologist and classical scholar, born at Salisbury. He was educated at Wadham College, Oxford, and studied law at Lincoln's Inn, although he never intended to practice that profession. From his father, who died in 1734, he received an inheritance sufficient to enable him to devote himself henceforth to study. Harris's interests were mainly in the classics and especially in Aristotle's philosophy. He also took an active part in political life, serving first as a magistrate for his county, and then from 1761 until his death as the member for Christchurch in the House of Commons. In 1763 he was appointed Lord of the Admiralty and after three months Lord of the Treasury. Eleven years later he became secretary and comptroller to the Queen. The works of Harris, which are now of historical interest merely, are a collection of three treatises—one on art, a second on music, painting, and poetry, and a third on happiness (5th ed., 1794); *Philosophical Arrangements* (1775), dealing with the Aristotelian philosophy; *Philological Inquiries* (1781), on style and literary criticism; and the book for which he is chiefly remembered, *Hermes, or a Philosophical Inquiry Concerning Universal Grammar* (1751), an attempt to force language into the forms of logic. He has also been supposed to be the author of *Spring, a Pastoral*, which was produced at Drury Lane in 1762. In 1801 his son, James Harris, first Lord Malmesbury, published a collection of his father's works in two volumes, with a biographical sketch.

HARRIS, James. An English diplomat. See Malmesbury, James Harris, first Earl of.

HARRIS, James Rendel (?–). An English philologist, paleographer, and biblical scholar. He studied at Clare College, Cambridge, and was its fellow and librarian. He held professorships at Johns Hopkins University (1882–85) and Haverford College (1886–92), and later was university lecturer in paleography at Cambridge University (1893–1903), and professor of theology in the University of Leyden (1903–04). In 1910 he was Haskell lecturer at Oberlin College. He traveled extensively in the East in search of manuscripts. Honorary degrees were conferred upon him by a number of English and other universities. Among his writings are: *The Teaching of the Apostles and the Sibylline Books* (1885); *The Teachings of the Apostles* (1887); *The Rest of the Words of Baruch* (1889); *The Diatesseron* (1890); *The Acts of Perpetua* (1890); *The Apology of Aristides* (1891); *Codex Sangallensis* (1891);

Popular Account of the Newly Recovered Gospel of St. Peter (1892); *Fragments of Ephrem Syrus* (1895); *Hermas in Arcadia* (1896); *Letters from Armenia* (1897); *Homeric Centones* (1898); *The Gospel of the Twelve Apostles; The Annotators of the Codex Bezæ* (1901); *Sidelights on New Testament Researches* (1909); *The Odes and Psalms of Solomon* (1910).

HARRIS, Joel Chandler (1848–1908). An American writer of fiction, and journalist, born at Eatonton, Ga., Dec. 8, 1848. His first occupation was that of a printer's apprentice, and he worked on a local weekly, *The Country Man.* He studied law, and practiced at Forsyth, Ga., but also did editorial work, and in 1876 joined the staff of the Atlanta *Constitution*, of which he became editor in 1890. It was to this paper that he contributed the very successful studies of Afro-American folklore, collected in 1880 as *Uncle Remus, his Songs and his Sayings,* a volume which has become a classic of its kind, since it appeals alike to scientific students of popular tradition and to the general public, old and young. He continued with other sketches, such as *Nights with Uncle Remus* (1883); *Mingo and Other Sketches* (1884); *Free Joe and Other Georgian Sketches* (1887); *Daddy Jake the Runaway and Short Stories* (1889); *Chronicles of Aunt Minervy Ann* (1899); *Balaam and his Master* (1891); *Tales of the Homefolks in Peace and War* (1898); *Gabriel Tolliver* (1902); *The Tar-Baby and other Rhymes* (1904); *Wally Wanderson and his Story-Telling Machine* (1903); *Told by Uncle Remus: New Series* (1905)—weaving into fiction frequent touches of folklore, as do the juveniles *Little Mister Thimblefinger* (1894), *Aaron in the Wildwoods* (1897), and several other volumes. Mr. Harris also made a memoir of Henry W. Grady (1890) and contributed to the history of his State a volume on *Georgia from the Invasion of De Soto to Recent Times* (1899). No one has more successfully portrayed the humorous side of negro character and imagination; he has also given an admirable picture of Georgia life in general. He was a member of the American Academy of Arts and Letters. On July 3, 1908, he died at Atlanta.

HARRIS, Joseph. An English actor. His first recorded appearance was as Alphonso in *The Siege of Rhodes* (1681), written by Sir William Davenant, to whose company he belonged. He also played Shakespearean rôles in the same cast as Betterton and was said to be nearly as clever in the creation of character as this actor, and quite as versatile, his range extending from Romeo to Sir Frederick Frolic in *Love in a Tub.* He is mentioned in Pepys's *Diary* as a very airy gentleman, and it is also on record that he maimed a brother actor for life by fencing without a button on his foil.

HARRIS, Joseph (1828–92). An agricultural writer. He was born at Shawbury, England. He undertook the study of agricultural chemistry, which he pursued with Lawes and Gilbert at Rothamsted, and which formed the basis of many of his writings. At the age of 21 he came to America and in 1864 began writing for the agricultural press. He continued his work along these lines and in 1884 began a comprehensive series of articles, 171 in all, entitled "Walks and Talks on the Farm," the first of which appeared in the *Genesee Farmer,* of which he was editor, and the remainder in the *American Agriculturist,* to which the *Genesee Farmer* had been sold. Perhaps none of his other writings exercised so wide an influence in paving the way for improved farming and earned for him so high a place in American agriculture. They are actual talks with a neighbor and not, as many suppose, with an imaginary person. Among his other writings may be mentioned his books: *Harris on the Pig* (1888); *Talks on Manures* (1883); *Gardening for Young and Old* (1882).

HARRIS, Merriman Colbert (1846–). An American Methodist Episcopal bishop, born at Beallsville, Ohio. He served three years in the Twelfth Ohio Cavalry during the Civil War, and entered the ministry in 1869. In 1873 he graduated from Allegheny College and was immediately sent as a missionary to Japan. From 1886 to 1904, while superintendent of the Japanese mission at San Francisco, he established missions on the Pacific coast and in Hawaii. In 1904 he was elected Missionary Bishop of Japan and Korea. He became a member of the Royal Asiatic Society and the Japan Society of London, was twice decorated by the Emperor of Japan, receiving the third-class Order of the Sacred Treasure, and is the author of *Christianity in Japan* (1907).

HARRIS, Mrs. A mythical personage, frequently mentioned in Dickens's *Martin Chuzzlewit,* by Sairey Gamp (q.v.).

HARRIS, Robert (1849–). A Canadian genre and portrait painter. He was born in the Vale of Conway, North Wales, but came early with his parents to Charlottetown, Prince Edward Island. He was educated at the Prince of Wales School, Charlottetown, was for a time a provincial land surveyor, and practiced as a self-taught painter. He then studied with Legros in the Slade Arts School, London, and under Bonnat in Paris, and traveled in Italy, Holland, and Belgium. Returning to Canada, he first established himself at Toronto, but soon removed to Montreal. He was director of the art school of Montreal (1883–87), and original member of the Royal Canadian Academy (1884) and its president (1893–96); was created C.M.G. (1902); received gold medals at the Pan-American Exposition, Buffalo, 1901, and the World's Fair, St. Louis, 1904. His genre paintings treat subjects of Canadian life; the best known are "The School Trustees" (National Gallery, Ottawa) and "The Fathers of the Confederation" (1883), a commission of the Canadian government, now in the Parliament Building, Ottawa. Most of his works, however, are portraits. In the Montreal Museum are "A Man of Small Importance" and portraits of a superior of the Order of Jesuits, the Rev. Mr. Morman, and Lady Minto.

HARRIS, Robert Carr (1843–). A Canadian civil engineer and educator, born in London, England, and educated there at King's College. Having begun practice in 1864, he was assistant engineer during construction of the Intercolonial Railway (1867–72), and assistant district engineer (1872–75), and in 1875–76 was division engineer of the Canadian Pacific Railway and of the Quebec Government Railway. His work on the Canadian Pacific included the calculating of bridge superstructure trusses and the inspection of bridges from the Rocky Mountains to Vancouver, British Columbia. In 1879–97 Harris was professor of civil engineering in the Royal Military College, Kingston, in 1898–1901 professor of general engineering in the School of Mines in that city, in 1902–04 chief engineer of trial and location surveys on the Brockville and Sault Ste. Marie Railway, in 1906–09 division engineer of the Canadian Pacific Railway, Guelph and Goderich location and construction; and in 1910 he had charge of mining surveys in northern New Brunswick. He was elected an associate of the Institute of Civil Engineers, London, England. His publications include: *A Textbook of Civil Engineering; A Textbook on Bridge Calculations; Sanitary Engineering; Reclamation of Tidal Marshes from the Sea.*

HARRIS, Samuel (1814–99). An American Congregational theologian, born in East Machias, Me. He graduated at Bowdoin College in 1836 and at Andover Theological Seminary three years later. He taught, and occupied Congregational pulpits until 1855, when he was chosen professor of systematic theology in the Bangor Seminary. He was president of Bowdoin from 1867 to 1871, when he became professor of systematic theology in Yale Divinity School. Among his publications the most important are: *Kingdom of Christ on Earth* (1874); *The Philosophical Basis of Theism* (1883); *The Self-Revelation of God* (1887); *God, Creator and Lord of All* (1897).

HARRIS, Thaddeus William (1795–1856). An American entomologist, born at Dorchester, Mass. He graduated at Harvard in 1815 and became a practicing physician, but devoted a great part of his time to the study of natural history. In 1831 he became librarian of Harvard. He was a member of the State Commission appointed in 1837 to make a botanical and zoölogical survey of Massachusetts and devoted himself particularly to the preparation of a *Systematic Catalogue of the Insects of Massachusetts.* He founded the Harvard Students' Natural History Society and the Massachusetts Horticultural Society and published a valuable report on *Insects Injurious to Vegetation* (1841; new ed., 1852). He took a deep interest in antiquarian research, and published more than 50 papers on this subject.

HARRIS, Thomas Lake (1823–1906). An American spiritualist, born at Fenny Stratford, England. In 1827 his parents settled in Utica, N. Y. His father failed in business, and the son began to write for the press at an early age. He became a Universalist preacher at Minden, N. Y., in 1844. Soon afterward he organized a "Christian Society" in New York and then embraced spiritualism and joined a community at Mountain Cove, Va. From the common spiritualistic doctrine he soon broke away and in 1861 organized a community, which was settled successively at Amenia and Brocton, N. Y., and then at Santa Rosa, Cal. A part of his following, under the leadership of Laurence Oliphant, broke away from him and, charging him with robbery, they recovered several thousand dollars through the courts. He wrote: *Truth and Light in Jesus* (1860); *The Millennial Age* (1861); and an historical sketch, *The Trent Affair* (1896). On his *Brotherhood of the New Life,* consult Allen, *T. L. Harris, the Seer* (London, 1897).

HARRIS, Townsend (1804–78). The first representative of the United States in Japan. He was born at Sandy Hill, N. Y. Educated at home, he moved at the age of 14 to New York City and entered upon a business life as a leather merchant. He was strict and diligent in self-culture and much interested in popular education. While serving two terms as president of the Board of Education, he succeeded in spite of much opposition in getting established the New York Free Academy, now the College of the City of New York. In 1848 he projected and entered upon a trading and exploring voyage on the Pacific, and during the five years spent in it he gained much information in regard to Orientals and their ways. He served as Consul at Ningpo in 1854, and in 1855, on the nomination of William H. Seward and Commodore Perry, he was appointed by President Pierce to be the first Consul General to Japan, in accordance with the provisions of the treaty which Commodore Perry had made with the Shogun's government in 1854. On his way out he negotiated a treaty with Siam. On Sept. 4, 1856, he raised at Shimoda the United States consular flag—the first foreign flag to float over any part of Japan. Refusing to deliver the letter of the President of the United States to the Shogun, except in personal audience, he succeeded, after 18 months' parleying, and entering Yedo Nov. 30, 1857, he had audience with the Shogun in his palace on December 7. The next four months were spent in treaty negotiations, and after much opposition and many delays he secured the signature of Premier Ii to a treaty which became the model for 20 subsequent treaties between Japan and other nations. On July 7 he was made Minister Resident and at once established his legation at Yedo. Resigning office Oct. 21, 1861, he returned to New York and was active in many societies until his death there.

Consult: Griffis, *The First American Envoy to Japan* (Boston, 1895); Satow, *Agitated Japan* (London, 1896); Nitobé, *The Japanese Nation* (New York, 1912).

HARRIS, Victor (1869–). An American song composer, born in New York. He was a pupil of Charles Blumm, William Courtney, F. K. Schilling, and Anton Seidl. He was a successful organist and from 1889 to 1895 held important appointments in Tuxedo Park, Brooklyn, and New York. He was for three years a teacher and coach at the Metropolitan Opera, New York; for one season was conductor of the Utica Choral Union and served as assistant conductor under Seidl at the Brighton Beach summer concerts (1895–96). He afterward took up his residence in New York and established himself as a vocal instructor and composer. He published compositions for piano, organ, and chorus, but is principally known for his songs.

HARRIS, William Laurel (1870–). An American mural painter, born in Brooklyn, N. Y. He studied under T. W. Dewing in New York City, and under Gérôme, Galland, Lefebvre, and Doucet in Paris. After his return to America he assisted in the decorations of the Library of Congress and of St. Bartholomew's Church, New York. His chief independent work (for ecclesiastical institutions) is in a style recalling the great religious painting of early times, yet it is modern in its realistic conception. Among such works are: "St. Francis de Sales before Pope Clement VIII" (Catholic University, Washington); "The Holy Sacrifice" and "Our Lady of the Lake" (St. Mary's, Lake George, N. Y.); and the design for the tapestry back of the Cardinal's throne in St. Patrick's Cathedral, New York. By far his most important achievement is the great decorative scheme for the church of the Paulist Fathers, New York City, upon which he was still engaged in 1914, and which comprises a large "Crucifixion" and 30 other mural paintings. Harris became a member of the Architectural League and was secretary of the Society of Mural Painters (after 1909) and president of the Municipal Art Society, New York (after 1912).

HARRIS, William Logan (1817–87). An American Methodist Episcopal bishop, born in Mansfield, Ohio. In 1837 he entered the ministry, but for some years he was engaged in educational work, from 1851 to 1860 as professor of chemistry and natural history in Ohio Wesleyan University. In 1860 he became one of the secretaries of the missionary society of his church, he was secretary of the general conferences of 1856, 1860, 1864, 1868, and 1872, and in 1872 he was elected Bishop. His writings include: *The Constitutional Powers of the General Conference* (1860); *Ecclesiastical Law and Rules of Evidence* (1885), with William J. Henry; *The Relations of the Episcopacy to the General Conference* (1888). He edited Bishop Baker's *Guide Book in the Administration of the Discipline of the Methodist Episcopal Church* (1873).

HARRIS, Sir William Snow (1791–1867). An English electrician, born at Plymouth and educated at Edinburgh. He practiced medicine for a few years, but after his marriage, in 1824, devoted himself to electricity. His system of lightning conductors for ships, patented in 1820, was introduced in the British navy after more than 20 years' consideration. He was knighted in 1847 and in 1860 was made government referee on electrical cases. Besides many publications on his method of fixed conductors, Harris wrote the excellent handbooks, *Electricity* (1848), *Magnetism* (1850–52), and *Galvanism* (1856); and a *Treatise on Frictional Electricity*, edited, with a biographical memoir, by Tomlinson (1867).

HARRIS, William Torrey (1835–1909). An American educator and philosopher. He was born at Killingly, Conn., and was educated at Phillips Andover Academy and at Yale College. From 1857 to 1867 he was assistant superintendent of the St. Louis public schools and from 1867 to 1888 superintendent. In 1867 he established and became editor of the *Journal of Speculative Philosophy*, the first periodical of its kind in the English language. He was received with distinction at the Paris Exposition of 1878, represented the United States Bureau of Education at the Brussels Educational Conference in 1880, and at the Paris Exposition of 1889, where he received from the French government the honorary title Officier de l'Instruction Publique, and from 1889 to 1906 he served as United States Commissioner of Education. As Commissioner, he rendered eminent service in formulating a statement of American educational theories and in giving practical definition to pedagogic principles. He was the founder of the St. Louis Philosophical Society and in 1875 was president of the National Education Association. A prominent member of the Concord School of Philosophy, his writings stamp him as one of the clearest expositors in America of German philosophical thought; he was an enthusiastic Hegelian and did more, perhaps, than any one else to make Hegelianism influential in American philosophy. He was chief editor of the "Appleton School Readers"; editor of the department of philosophy in *Johnson's Encyclopædia;* and editor in chief of the edition of *Webster's New International Dictionary*, published just prior to his death. He received the degree of LL.D. from various American and foreign universities. Besides voluminous reports on educational matters, many papers contributed to the *Proceedings of the American Social Science Association*, and various compilations edited by him, his publications include: *Introduction to the Study of Philosophy* (1889); *The Spiritual Sense of Dante's Divina Commedia* (1889); *Hegel's Logic: A Critical Exposition* (1890); *Psychologic Foundations of Education* (1898); *Elementary Education* (1900; 2d ed., 1904); *The School City* (1906).

HARRIS BUCK. The sable antelope (q.v.), so called because discovered by Sir W. C. Harris, author of *Portraits of the Game and Wild Animals of Southern Africa*, issued in London in 1840 as a magnificent folio book, with colored plates.

HAR'RISBURG. A city and the county seat of Saline Co., Ill., 70 miles northeast of Cairo, on the Cleveland, Cincinnati, Chicago, and St. Louis and the Southern Illinois Railway and Power Company railroads (Map: Illinois, G 10). It is surrounded by an agricultural district in which are valuable deposits of coal and has flour and saw mills, brickworks, large coal operators, carriage and wagon shops, etc. The city contains a Carnegie library and fine post-office building. Harrisburg adopted the commission form of government in 1913. Pop., 1900, 2202; 1910, 5309.

HARRISBURG. A city, the capital of Pennsylvania, and the county seat of Dauphin County, 105 miles west by north of Philadelphia, on the Susquehanna River, and the Pennsylvania, the Philadelphia and Reading, and the Cumberland Valley railroads (Map: Pennsylvania, H 7). The river, almost a mile wide at this point, is spanned by four bridges, including two iron and steel railroad bridges and a new steel and concrete driving bridge which replaced the historic Old Camel-Back Bridge. The city has a picturesque location, and there are a number of notable structures. The State buildings are in a beautiful park of 55 acres, the Capitol occupying a conspicuous site. The Capitol building, replacing the one destroyed by fire in 1897, is built of brick and steel, veneered with granite on the outside, and the interior finished in marble, and profusely decorated, the estimated cost being $10,500,000. The State library, founded in 1796, contains more than 170,000 volumes. In Capitol Park is a monument to the soldiers who fell in the Mexican War, and also, on the west side of the Capitol, a statue of Gen. John F. Hartranft. The Dauphin County Soldiers' Monument, a shaft 110 feet high, in honor of the soldiers of the county who died in the Civil War, stands in State Street. Other noteworthy features are the courthouse, Governor's residence, State arsenal, State insane hospital, county prison, technical and classical high schools, city hospital, Home for the Friendless, and the Children's Industrial Home. Harrisburg is the seat of a Roman Catholic bishop.

Owing to its excellent transportation facilities, Harrisburg occupies a position of considerable importance in the industrial and commercial world. There are extensive iron and coal mines in the vicinity; and the city's iron and steel interests are worthy of particular mention. There are roundhouses and repair shops of the Pennsylvania Railroad; also foundries and machine shops, tin mills, rolling mills, nail works, furnaces, typewriter works, boot and shoe factories, breweries, pipe-bending works, and extensive manufactures of beds and mattresses, women's hats, clothing, silk goods, carriages and wagons, flour, brooms, brick and tile, galvanized iron cornices, marbleized slate, and various lumber products. Harrisburg adopted the commission form of government in December, 1913, the power being vested in a mayor and four councilmen, each of whom acts as superintendent of one of the five city departments, viz., public affairs, accounts and finance, public safety, streets and public improvements, and parks and public property. The mayor holds office for four years, and the councilmen for two. All officers are chosen by the council, except the city controller, who is elected by popular vote. The schools are governed by an elective board of nine members. The municipal income in 1914 was about $1,508,000, while the expenditures amounted to $1,475,000. Harrisburg has always been a growing and progressive community. The following is a statement of its population by decades: 1850, 7834; 1870, 23,104; 1880, 30,762; 1890, 39,385; 1900, 50,167; 1910, 64,186; 1914 (U. S. est.), 69,493.

In 1719 John Harris, an English trader, settled here and 14 years later secured grants of 800 acres in this vicinity. In 1753 his son established a ferry, and the place was long known as Harris's Ferry. In 1785 a town was laid out and named Harrisburg, but in the following year it was renamed Louisburg, in honor of Louis XVI. In 1791 it was incorporated as Harrisburg; in 1812 it became the capital of the State, and in 1860 it was chartered as a city. The assembling here of the Harrisburg Convention in 1828, which was attended by representatives of the radical protectionists of New England and the Middle States, led to the passage of the high protective-tariff bill of that year. In 1839 Harrison and Tyler were nominated at Harrisburg. Consult Egle, *Centenary Memorial of the Erection of the County of Dauphin and the Founding of Harrisburg* (Harrisburg, 1886), and Morgan, *Annals of Harrisburg* (rev. by F. M. Black, 1906).

HAR'RISON. A city and the county seat of Boone Co., Ark., 58 miles east-southeast of Eureka Springs, on the Missouri and North Arkansas Railroad (Map: Arkansas, B 1). It has a government building which cost $100,000 and large railway shops. The town is in a fertile district adapted to fruit growing, farming, lumbering, and stock raising. There are several flour mills and other industrial establishments. Pop., 1900, 1551; 1910, 1602.

HARRISON. A town in Hudson Co., N. J., on the Passaic River, and on the Delaware, Lackawanna, and Western, the Erie, and the Pennsylvania railroads (Map: New Jersey, D 2). It adjoins Newark, with which it is connected by three steel bridges. The town has extensive manufacturing interests, which include a large steel plant, pump and tube mills, elevator works, roller-bearing factory, hoisting-engine plant, wall-plaster works, metal-novelty factory, foundries, tool shops, marine-engine works, wire and wire-cloth factories, electric works, machine shops, lumber and stone yards, a tannery, breweries, etc. Settled as early as 1668, Harrison was incorporated in 1873, the charter of that date being still in operation. The government is vested in a mayor and a common council, which is elected by wards. Pop., 1900, 10,596; 1910, 14,498; 1914 (U. S. est.), 16,160.

HARRISON, Benjamin (c.1740–91). An American Revolutionary patriot, one of the signers of the Declaration of Independence, born at Berkeley, Va. As a member of the Virginia House of Burgesses, in 1765, he opposed the Stamp Act resolutions of Patrick Henry, which he considered to be impolitic and premature. From 1774 to 1777 he was one of Virginia's representatives in the Continental Congress, and was a member of many important committees, though he rendered the greatest service as president of the Board of War. On June 10, 1776, he introduced a resolution declaring the independence of the American Colonies and on July 4 reported the Declaration of Independence. From 1777 to 1782 he was Speaker of the House of Burgesses and from 1782 to 1784—for two terms—was Governor of the State and then returned to the Legislature for four years. In 1788 he was a member of the Virginia convention which ratified the Federal Constitution, though he, along with Patrick Henry and other men of prominence, opposed it—largely because of the absence of a bill of rights. He was the father of William Henry Harrison (q.v.). Consult Sanderson, *Biography of the Signers of the Declaration of Independence*, edited by Brotherhead (Philadelphia, 1865).

HARRISON, Benjamin (1833–1901). The twenty-third President of the United States, born at North Bend, Ohio, Aug. 20, 1833. His father, John Scott Harrison (1804–78), a son of President William Henry Harrison, represented the Whigs in Congress from 1853 to 1857. Benjamin passed his early years on his father's farm and at a log schoolhouse in the neighborhood. Later he studied two years at Farmers College, at College Hill, near Cincinnati, and in 1852 he graduated at Miami University. After studying law in Cincinnati, he was admitted to the bar (1853), married the daughter of Rev. J. W. Scott, and settled in Indianapolis in 1854. In 1860 he was elected reporter of the Supreme Court of Indiana, and in a political debate with Thomas A. Hendricks soon afterward acquired reputation as a speaker. He entered the Federal army as second lieutenant in July, 1862; assisted in organizing the Seventieth Indiana Regiment; was promoted in August, 1862, to be colonel; served in Kentucky and Tennessee; led a charge at Resaca, Ga., May 15, 1864, in which one-third of his command was killed or disabled; commanded his brigade with signal bravery at Kenesaw Mountain, June 29 to July 3, 1864, and at Peachtree Creek, July 20; took part in the operations around Nashville, and on Jan. 23, 1865, was brevetted brigadier general of volunteers "for ability and manifest energy and gallantry in command of brigade." Returning to civil life, he resumed his occupation of reporter of the Supreme Court, but in 1868 declined reelection. In 1876 he was the Republican candidate for Governor of Indiana, but was defeated, though running 2000 votes ahead of his ticket. In 1878 he was appointed a member of the Mississippi River Commission. In 1880 he was elected United States Senator, taking his seat March 4, 1881, and during his term of office opposed alien ownership of large tracts of land and the Blair Educational Bill, favored civil-service reform, and was one of a committee to perfect and report a bill restricting Chinese immigration. In 1888, at the Republican Convention in Chicago, he was nominated for the presidency, receiving 84 votes on the first ballot, 217 on the fourth, and 544 on the eighth. In the ensuing election he received 233 electoral votes to Cleveland's 168, Levi P. Morton, of New York, being elected Vice President. His administration was marked by no especially conspicuous features; but during it the Pan-American Congress, the initiation of the policy of commercial reciprocity (q.v.), and the attempt to annex Hawaii to the United States attracted much attention. The industrial situation was much altered by the McKinley Tariff of Oct. 1, 1890; the monetary system was disturbed by the Sherman Silver Bill; civil-service reform was extended; the Louisiana Lottery was abolished; the condition of both the army and the navy was improved; and many highly creditable appointments to office were made, especially in the Federal judiciary. In the summer of 1892 Harrison's Secretary of State, Mr. Blaine (q.v.), resigned and became an avowed candidate for the presidential nomination; but Harrison was again nominated, only to be defeated in the election by his predecessor, Grover Cleveland (q.v.), receiving 145 electoral votes. After leaving office he accepted a lectureship in international law at Leland Stanford Junior University, California. During the remaining years of his life he devoted himself to the practice of law, being retained in several cases of national importance, and in 1899 appearing as counsel for Venezuela before the commission appointed to arbitrate the boundary dispute with England. He was the principal representative of the United States at The Hague Conference (1899). His death occurred after a brief illness, at Indianapolis, March 13, 1901. He wrote numerous magazine articles, made a number of able speeches on public occasions, and published *This Country of Ours* (1897), in which he gave a description of the practical workings of the government. Another book, *Views of an Ex-President*, was published posthumously in 1901. Some of his speeches are collected by Hedges, *Through the South and West with President Harrison* (New York, 1892). Those which he delivered while President were published under the title of *Public Papers and Addresses of Benjamin Harrison* (Washington, 1893). Consult Wilson (ed.), *The Presidents of the United States* (New York, 1894), and the campaign biography by Wallace (Philadelphia, 1888). For an account of Harrison's administration, see UNITED STATES.

HARRISON, CARTER HENRY (1825–93). An American politician. He was born near Lexington, Ky., and, like William Henry and Benjamin Harrison, was a descendant of the Virginia Harrisons. He graduated at Yale in 1845, studied law the following year at Transylvania University at Lexington, was engaged in managing his large estate from 1847 to 1851, traveled for a year or more in Europe, and, in company with Bayard Taylor, in Asia Minor, Syria, and Palestine, and in 1852 returned to Kentucky to practice his profession. He soon began to take an active interest in politics and became an opponent of disunion and the extension of slavery. In 1857 he removed to Chicago, where faith in the future of the city led him to make profitable investments in real estate. In 1871 he was elected county commissioner of Cook County and from 1874 to 1878 was a Democratic member of Congress. In 1879 he was chosen mayor of Chicago and was reelected for biennial terms in 1881, 1883, and 1885. In 1884 he was the Democratic candidate for Governor of Illinois, but was defeated by Governor Oglesby by 14,500 votes. In 1891 he was an independent candidate for mayor and drew so largely from the vote of the Democratic candidate that the Republican was elected. The year 1893 was the year of the World's Fair at Chicago, and it was deemed by the business community, as well as by the reformers and promoters of the great enterprise, particularly necessary to have an able, high-minded administrator in the mayor's office. These elements joined with the Republicans and secured the nomination of Samuel W. Allerton, a man of acknowledged fitness. Harrison, however, after a long and bitter contest, in which there were frequent charges of fraud and intimidation, secured the Democratic nomination, and in April was triumphantly elected. He was assassinated on October 29 following, one of the closing days of the great Exposition. Although a political demagogue, Harrison differed from the modern political boss in that he relied on his personal popularity rather than machine organizations to win his victories, and, despite the fact that his methods of obtaining and maintaining power were somewhat open to question, it was never charged that he himself derived pecuniary gain from his office.

His son, CARTER HENRY (1860–), was born in Chicago. He was educated at Altenburg, Germany, and at the Law School of Yale, where he graduated in 1883. From 1891 to 1894 he was editor of the Chicago *Times*. He was mayor of Chicago from 1897 to 1905 and in 1911 was again elected, for the term ending in 1915.

HARRISON, CHARLES CUSTIS (1844–). An American university provost. He was born in Philadelphia, was educated at the University of Pennsylvania (A.B., 1862; A.M., 1865), and received the honorary degree of LL.D. from Columbia (1895), Princeton (1896), Yale (1901), and the University of Pennsylvania (1911). From 1863 to 1892 he was engaged in manufacturing. He became a trustee in 1876, was acting provost in 1894–95, and provost from 1895 to 1911, of the University of Pennsylvania.

HARRISON, CHARLES LEWIS (1857–1912). An American civil engineer, born in Callaway Co., Mo. He graduated from the University of Missouri (C.E.) in 1880; served on Mississippi River and other engineering operations; was in business for five years; and thereafter was in succession assistant engineer for the Sanitary District of Chicago, division engineer on the Chicago Drainage Canal, in the employ of the United States Board of Engineers on Deep Waterways, and of the Isthmian Canal Commission, and in 1900–02, as chief engineer of the Denver Union Water Company, built the Lake Cheesman Dam. While assistant engineer of the Pennsylvania Railroad (1902–08), he was engaged in the construction of the East River tunnels. In 1909–10 he served as deputy chief engineer on the board of water supply of New York City.

HARRISON, CONSTANCE CARY (1846–). An American novelist, mother of Francis Burton and Fairfax Harrison. She was born at Vaucluse, Va., and in 1867 was married to

Burton Harrison, a Virginia lawyer and private secretary to Jefferson Davis. With him she removed later to New York City, where she wrote many books and contributed to periodicals. Among her more noteworthy volumes of fiction are: *Golden Rod* (1880); *Bar Harbor Days* (1887); *The Anglomaniacs* (1887); *Sweet Bells out of Tune* (1893); *A Daughter of the South* (1892); *An Errant Wooing* (1895); *A Merry Maid of Arcady and Other Stories* (1897); *A Son of the Old Dominion* (1897); *Good Americans* (1898); *A Princess of the Hills* (1901); *Transplanted Daughters* (1909). In 1911 appeared *Recollections Grave and Gay*. For children she wrote: *Old-Fashioned Fairy Book* (1884) and *Folk and Fairy Tales* (1885). Worthy of mention also is *Externals of Modern New York* (1896). Her dramatic work consists chiefly of adaptations from the French.

HARRISON, Fairfax (1869–). An American railroad president, son of Constance Cary Harrison and brother of Francis Burton Harrison. He was born in New York City, graduated from Yale (B.A., 1890) and Columbia (M.A., 1891) universities, and was admitted in 1892 to the bar of New York City, where he practiced for four years. From 1896 to 1910 he served as solicitor, assistant to the president, and vice president of the Southern Railway Company. For three years he was president of the Chicago, Indianapolis, and Louisville Railway, and in 1913 he returned to the Southern Railway as its president.

HARRISON, Francis Burton (1873–). An American public official, son of Constance Cary Harrison and brother of Fairfax Harrison. He was born in New York City, graduated from Yale University in 1895 and from the New York School of Law in 1897, taught in the New York night law school in 1897–99, and was captain and adjutant general of United States Volunteers in 1898–99 during the Spanish-American War. He was elected member of Congress in 1903 and was again in the House from 1907 to 1913, when he resigned, having been appointed by President Wilson Governor-General of the Philippine Islands.

HARRISON, Frederic (1831–). The leader of the English Positivists and an accomplished man of letters, whose work in the fields of literature, history, philosophy, religion, and politics is sound and distinguished. Born in London, he was educated at King's College School, London, and at Wadham College, Oxford. He became fellow and tutor at Wadham, and was called to the bar in 1858. After practicing in the courts of equity he was appointed a member of the royal commission upon trade-unions (1867–69), secretary of the royal commission for digesting the law (1869–70), and professor of jurisprudence and international law at Lincoln's Inn Hall (1877–89). In 1889–92 he was alderman in the London County Council. In politics he supported the Liberal party. He was the president of the Positivist Committee (1880–1905). Among his many works are: *Meaning of History* (1862; enlarged, 1894); *Order and Progress* (1875); *The Choice of Books* (1886); *Oliver Cromwell* (1888); *Annals of an Old Manor House* (1893; new ed., 1899); *Victorian Literature* (1895); *The Millenary of King Alfred* (1897); *Tennyson, Ruskin, Mill, and Other Literary Estimates* (1900); *George Washington and Other American Addresses* (1901); *John Ruskin* (1902); *Theophano* (1904), an unfortunate lapse into historical romance; *Chatham* (1905); *Memories and Thoughts* (1906); *The Creed of a Layman* (1907); *Autobiographic Memoirs* (1911); *The Positive Evolution of Religion* (1912).

HARRISON, Gabriel (1818–1902). An American author and artist, born in Philadelphia, Pa. For several years he was an actor and at one time supported Charles Kean. Afterward he became the manager of several theatres and produced, among other plays, a dramatization of Hawthorne's *Scarlet Letter* (1878). He is also the author of a *Life of John Howard Payne* (1873) and a number of critical articles, notably *Edwin Forrest, the Actor and the Man, Critical and Reminiscent* (1889). He did much for the encouragement of the free art schools in connection with the Brooklyn Academy of Design and was also a portrait and landscape painter.

HARRISON, Henry Sydnor (1880–). An American novelist, born at Sewanee, Tenn. He graduated from Columbia in 1900 and received an honorary A.M. from the same university in 1913. The following year he was elected a member of the National Institute of Arts and Letters. He is author of *Queed* (1911), which was very well received; *V. V.'s Eyes* (1913); *Captivating Mary Carstairs* (1914), first published in 1911 under the pen name "Henry Second"; and of contributions to the *Atlantic Monthly* and other magazines.

HARRISON, James Albert (1848–1911). An American philologist, born at Pass Christian, Miss., and educated at the University of Pennsylvania. In 1871 he was appointed professor of Latin and modern languages in Randolph Macon College and in 1876 was chosen professor of English and modern languages in Washington and Lee University. He left this chair in 1895 to become professor of English and Romance languages at the University of Virginia. A short time before his death his title was changed to professor of Teutonic languages. He was an editor of the *Century* and the *Standard* dictionaries, and edited (with W. M. Baskerville): *Dictionary of Anglo-Saxon Poetry* (1883); *Library of Anglo-Saxon Poetry* (5 vols., 1883); *Beowulf* (1883); Madame de Sévigné's *Letters* (1898); Corneille's *Nicomède* (1901); Poe's *Complete Works* (17 vols., 1902). Among his other works are contributions to *Anglia* on "Negro English"; *Group of Poets and their Haunts* (1874); *Greek Vignettes* (1877); *Spain in Profile* (1879); *Story of Greece* (1885); *Life and Letters of Edgar Allan Poe* (1903); *Life of George Washington* (1906); *Last Letters of E. A. Poe to Sarah H. Whitman* (1909).

HARRISON, Jane Ellen (1850–). An English archæologist and Hellenist, born in Yorkshire. She studied at Newnham (Cambridge) and at the British Museum, visiting also the museums of Berlin, Munich, Rome, and Athens. After 1882 she lectured at the British Museum, South Kensington Museum, Cambridge, and Oxford. She received the honorary degrees of Litt.D. (Durham) and LL.D. (Aberdeen). Besides various papers in the learned periodicals, she wrote: *Myths of the Odyssey* (1882); *Introductory Studies in Greek Art* (1885); *Mythology and Monuments of Ancient Athens* (1890), with Mrs. A. W. Verrall; *Greek Vase-Painting* (1894), with D. S. MacColl; *Prolegomena to the Study of Greek Religion* (1903;

2d ed., 1908); *The Religion of Ancient Greece* (1906); *Primitive Athens as Described by Thucydides* (1906); *Themis. A Study of the Social Origins of Greek Religion* (1912); *Ancient Art and Ritual* (1913).

HARRISON, John (1693–1776). An English inventor, who became celebrated as "Longitude Harrison." He was born at Foulby in Yorkshire, where his father was the village carpenter and clock repairer. After receiving a meagre education he learned carpentering from his father and, in the intervals of his work, studied the construction of clocks and watches with a view to their improvement. His experiments resulted in the invention of the "gridiron pendulum" for clocks, which, by an arrangement of compensating steel and brass rods, allows for the expansion caused by variations of temperature; a "recoil escapement" to prevent the constant oiling and clogging of the pallets; and the "going ratchet" universally used to prevent a timepiece losing while being rewound. When the British government offered successively £10,000, £15,000, and £20,000 for the discovery of a method for determining the longitude at sea within 60, 40, and 30 geographical miles, he made four chronometers, now in the Greenwich Royal Observatory, each with a "compensation curb" to the balance wheel. All qualified for the first prize, the fourth, on a voyage to Barbados and return, determining the longitude within 10 miles. After much vexatious delay and petitions to Parliament the prize was paid to him in installments, it being stipulated that he should publish particulars of his invention *pro bono publico*. He wrote *A Description Concerning such Mechanism as Will Afford a Nice or True Mensuration of Time* (1767), and other pamphlets in connection with his discoveries. In 1897 his tomb in Hampstead Church was restored by the London Company of Clockmakers. Consult Smiles, *Men of Invention and Industry* (London, 1884).

HARRISON, Joseph, Jr. (1810–74). An American engineer, born in Philadelphia. He was conspicuously successful as a locomotive builder in the early days of that industry, and in 1840 his "Gowan and Marx" locomotive attracted the attention of two Russian engineers, who had been ordered by Emperor Nicholas to examine the systems of railroads and railroad machinery in Europe and America. As a consequence, he and his partner, A. M. Eastwick, together with Thomas Winans, of Baltimore, secured a contract to build the locomotives and other machinery for the railroad from St. Petersburg to Moscow, and later another contract, which continued until 1862, to repair the rolling stock of the railroad. On the expiration of these contracts he returned to Philadelphia, where he collected a gallery of paintings. In 1869 he published a volume containing a poem entitled *The Ironworker and King Solomon*, his autobiography, and numerous incidents of his life in Russia; and a few years later another, entitled *The Locomotive Engine, and Philadelphia's Share in its Early Improvements* (1872).

HARRISON, Joseph LeRoy (1862–). An American librarian, born at North Adams, Mass. He was educated at Cornell University and the University of Heidelberg and, after some newspaper work, studied at the New York State Library School, Albany. Thereafter he served as librarian of legislation in the New York State Library (1893–94), librarian of the Providence Athenæum (1894–1911), and of the Forbes Library at Northampton, Mass. (September, 1911–). In 1909 he superintended the American Library Association Exhibit at the Paris Exposition. He edited: *Cap and Gown* (1893), *With Pipe and Book* (1897), *In College Days* (1901)—collections of college verse; and is author of *The Great Bore, a Souvenir of Hoosac Tunnel* (1891); *Guide to the Study of James Abbott McNeill Whistler* (1895), with W. G. Forsyth; *The Providence Athenæum, 1753–1911* (1911).

HARRISON, (Lovell) Birge (1854–). An American genre and landscape painter, brother of T. Alexander Harrison. He was born in Philadelphia and studied with Carolus Duran (q.v.) and at the Ecole des Beaux-Arts under Cabanel. In 1881 he exhibited at the Salon and in 1882 he returned to America and subsequently spent considerable time (1889–93) painting and sketching in Australia, the South Seas, and New Mexico. He received numerous prizes and medals, including the gold medal at the Pennsylvania Academy of Fine Arts in 1910. He became a member of the National Academy of Design (1910), National Institute of Arts and Letters, New York Water Color Club, Society of American Artists, and director of the landscape school of the Art Students' League. He contributed very frequently to art and other magazines and in 1909 published *Landscape Painting*. Harrison is especially known as a painter of snow scenes, which he renders with fidelity to nature and much poetic feeling. Among his best-known paintings are: "November" (Museum, Marseilles); "Return from the First Communion"; "Summer Idyl"; "Calling Home the Cows"; "The Hidden Moon," "Quebec from the River" (both exhibited in 1907); "Moonlight off Charleston" (1908); "The Flatiron Building in a Blizzard" (1909); "Sunset Reflections" (1912); "Floating Ice"; "Moonrise on the Beach" (1913). Among his chief works in American public collections are: "The Mirror," Wilstach collection, Philadelphia; "Autumn Sunset" and "A Glimpse of the St. Lawrence," Pennsylvania Academy of Fine Arts, Philadelphia; "Fifth Avenue at Twilight," Detroit Museum.

HARRISON, Mary St. Leger (pen name Lucas Malet) (1852–). An English novelist, daughter of Charles Kingsley (q.v.). She was born at Eversley rectory and was educated at home and at University College, London. In 1876 she married William Harrison, a young clergyman in whom her father had been much interested, and afterward settled at Clovelly in Devonshire, amid the scenes of her father's boyhood. Her husband died in 1897, after which she visited the Continent, America, and India in search of health. Her popular novels of English life are written with an ethical purpose. Among them are: *Mrs. Lorimer* (1882); *The Wages of Sin* (1891); *The Carissima, a Modern Grotesque* (1896); *The Gateless Barrier* (1900), a ghost story; *Sir Richard Calmady* (1901), a painful but powerful novel; *The Score* (1909); *Adrian Savage* (1911).

HARRISON, Robert Alexander (1833–78). A Canadian jurist. Born in Montreal, Province of Quebec, he early went to Toronto and was educated at Upper Canada College, which he left in 1849 to study law. At 18, while still a law student, he began the preparation of a digest of all cases determined in the Queen's Bench and practice courts of Upper Canada from 1823 to 1851. It was completed and published in two years and became a work of permanent value. In 1854 he was appointed chief clerk in the Crown Law Department for Upper Canada, and in 1855 was called to the bar. At this time he was a frequent and influential contributor to the *Daily Colonial* (Toronto) and other periodicals. In 1859, after writing several legal works, he retired from the chief clerkship and began active practice, in which he was highly successful. In 1867–72, as a member of the Legislature for West Toronto, he helped enact important laws. For several years he was joint editor of the *Upper Canada Law Journal*, and in 1875 he became Chief Justice of Ontario. He published: *Digest of Cases Decided in the Queen's Bench, Upper Canada, from 1823 to 1851* (1852); *Statutes of Upper Canada to 1856* (1857); *Common Law Procedure Act* (1857); *Sketch of the Legal Profession in Upper Canada* (1858); *Manual of Costs in County Courts* (1858); *The Assessor's Guide* (1864); *The Municipal Manual for Upper Canada* (1867).

HARRISON, Ross Granville (1870–). An American anatomist, born at Germantown (Philadelphia). He graduated in 1889 (Ph.D., 1894) from Johns Hopkins University, where he was instructor and associate in anatomy in 1896–99 and assistant professor of anatomy until 1907. In 1899 he received the degree of M.D. from the University of Bonn. In 1907 he was appointed to the professorship of comparative anatomy at Yale University. He became managing editor of the *Journal of Experimental Zoölogy* in 1903 and trustee of the Marine Biological Laboratory at Woods Hole, Mass., in 1908, was president of the American Association of Anatomists in 1911–13, president of the American Society of Naturalists in 1912–13, and in 1914 was awarded the Archduke Rainer gold medal of the Austrian Zoölogical and Botanical Society.

HARRISON, Samuel Bealy (1802–67). A Canadian statesman. Born in Manchester, England, he studied law and was called to the English bar. About 1835 he came to Canada and in 1838–39 was private secretary to Sir George Arthur, the last Lieutenant Governor of Upper Canada. Taking an active interest in the issues which precipitated the Act of Union of 1841 (see Canada, *History*), he at all times strongly supported responsible government. After two unsuccessful attempts to enter Parliament, he was elected as a moderate Liberal member for Kingston to the Canada Legislative Assembly. Having been made Provincial Secretary for Upper Canada in the first executive council summoned by Lord Sydenham under the Act of Union, he retained this position until 1843, then resigning because he opposed the removal of the seat of government to Montreal. For some months he was Premier. The administration was a coalition, the Conservative members being led by William Henry Draper (q.v.) and the Liberals, or Reformers, supporting Robert Baldwin (q.v.) and Harrison. Harrison procured the passage of an important measure providing municipal institutions for Upper Canada. From 1841 to 1844 he was a member of the Board of Public Works, and later he was made a county and surrogate judge.

HARRISON, Susan Frances (1867–). A Canadian author. She was born in Toronto, Ontario, and was educated in her native city and in Montreal. She began early to write reviews and short stories for the press and later was music critic. Her contributions in prose and verse were accepted by the leading magazines of Great Britain and the United States. She published many songs written and composed by herself, became an authority on old French-Canadian folk songs, and made many studies of French-Canadian life and character. Her principal publications are: *Crowded Out* (1888), a collection of short stories; *The Canadian Birthday Book* (1889); *Pine, Rose, and Fleur-de-lis* (1889); *Down the River* (1891); *The Forest of Bourg-Marie* (1900), a novel.

HARRISON, Thomas (1606–60). An English regicide. He was born at Newcastle-under-Lyme, Staffordshire, and although of humble parentage received a good education. He studied for the law in an attorney's office in Clifford's Inn, London, but at the opening of the Civil War in 1642 joined the regiment of life guards raised by Essex. He distinguished himself in several actions and rose to the rank of major general. In 1646 he was elected member of Parliament for Wendover. He was in command of the escort that conveyed King Charles from Hurst Castle to London and was one of the most energetic advocates of the King's trial and execution. In 1650, during Cromwell's absence in Ireland, he was commander in chief of the military forces in England, and in 1651 was elected a member of the Council of State, to which he had been nominated two years previously. His connection with the Fifth Monarchy Men (q.v.) and his conspiracies against Cromwell resulted in imprisonment and the loss of his commission and offices. At the Restoration he refused to flee, and as one of the seven regicides excluded from the Act of Indemnity was condemned to death. Justifying his actions and bearing himself bravely on the scaffold, he was executed on Oct. 13, 1660. Consult Ida Taylor, *Revolutionary Types* (London, 1904), and Simpkinson, *T. Harrison, Regicide* (London, 1905).

HARRISON, Thomas (1839–1906). A Canadian educator. He was born at Sheffield, Sunbury Co., New Brunswick, graduated with high honors in mathematics at Trinity College, Dublin, and from Dublin also received the degree of LL.D. in 1869. In 1870 he was appointed professor of the English language and literature and also of mental and moral philosophy in the University of New Brunswick at Fredericton. In 1885 he became president of the university and professor of mathematics. The last-named position he resigned in 1892 on being elected chancellor. In 1874 he was made superintendent of the meteorological station at Fredericton. He wrote the reports of tri-hourly observations in *Meteorological Observations of the Dominion of Canada* (Ottawa).

HARRISON, (Thomas) Alexander (1853–). An American genre and landscape painter, brother of L. Birge Harrison. He was born in Philadelphia, and studied at the Pennsylvania Academy of Fine Arts and later under Gérôme (q.v.), at the Ecole des Beaux-Arts, and under Bastien-Lepage, but was most strongly influenced by the works of Cazin and Bernard. His work is characterized by grace of line and by luminous color, delicate in its effect. He is especially noted for his marines, which are rendered with broad surfaces that well express the transparency of the ever-changing color of water and sky. Although frequently visiting the United States, he took up his residence in Paris, where he came to rank among the highest of the colony of American artists. He was made Officer of the Legion of Honor in 1901 and Officer of Public Instruction, by the French government, and became a member of the National Academy of Design (1902), the Société Nationale des Beaux-Arts, National Institute of Arts and Letters, the Royal Institute of Painters in Oil Colors, London, and a corresponding member of the Societies of Secessionists, Berlin and Munich. He received gold medals at Paris (1889) and at the Pennsylvania Academy of Fine Arts, Philadelphia (1894). Among his chief works in American public collections are: "Castles in Spain," Metropolitan Museum of Art, New York; "Amateurs," Art Institute of Chicago; "The Wave," Pennsylvania Academy of Fine Arts, Philadelphia; "Twilight," St. Louis Museum and Corcoran Gallery, Washington; "The Great Mirror" and "Marine," Wilstach collection, Philadelphia. He is represented in the Luxembourg Gallery, Paris, by "Arcady" and "Solitude," and elsewhere in France and in the Dresden Gallery. Later important works are: "Setting Sun"; "Golden Sands" (1912); "Caressing Waves" (1913).

HARRISON, William (1534–93). An English topographer and chronologist, born in London. He was educated in the St. Paul and Westminster schools, took art courses at Oxford and divinity at Cambridge, became chaplain to Lord Cobham of Kent, and afterward rector of Radwinter, Essex. He was also canon at Windsor, where he died; but he is most widely known by his work on the *Chronicles* of Holinshed, the source whence Shakespeare drew the material for his historical plays. Harrison's share therein is invaluable for the local color of the sixteenth century, being *An Historicall description of the Iland of Britaine, with a brief rehersall of the nature and qualities of the people of England and such commodities as are to be found in the same comprehended in three books and written by W. H.* The New Shakespeare Society brought out a modern edition of this work in 1877–81.

HARRISON, William Henry (1773–1841). Ninth President of the United States. He was the son of Benjamin Harrison (1740–91), a signer of the Declaration of Independence; was born at Berkeley, Charles City Co., Va., Feb. 9, 1773; was educated at Hampden-Sidney College and, although the profession of medicine had been chosen for him, entered the army as an ensign in 1791, became a lieutenant in June, 1792, and served against the Indians as an aid-de-camp on the staff of General Wayne, taking part in the battle of the Maumee and in other engagements, and becoming a captain in May, 1797. Resigning in June, 1798, he was soon appointed Secretary of the Northwest Territory under Gen. Arthur St. Clair, but in October, 1799, resigned that position to become a Territorial Delegate in Congress, where, in May, 1800, he secured the passage of a law encouraging the sale of land in sections or half sections to actual settlers. The same year he was appointed Governor of Indiana Territory, which then comprised the region later embraced in the States of Indiana, Illinois, Michigan, and Wisconsin, and for a time subsequent to the Treaty of 1803 his jurisdiction also extended over that part of the lands then acquired from France by the Louisiana Purchase (q.v.), which was known as the District of Louisiana. Harrison's executive work in the Northwest continued until September, 1812, and was marked by conspicuous success in a variety of difficult undertakings, in which he secured the hearty appreciation of the people affected by his administration and the marked approval of the national government. With the proslavery party he sought the establishment of a second-grade government, with a representative assembly, as a means of promoting slavery. The first law passed by that assembly (1805) was one in response to Harrison's first recommendation, that for preventing the sale of liquor to the Indians. In the courts, too, and on various occasions he urged justice to the red men. He concluded several treaties with the Indians by which a total amount of about 75,000 square miles of territory was ceded to the United States, the first among them being the Treaty of Fort Wayne, on June 7, 1803. Some of these cessions aroused the hostility of Tecumseh and his brother, the Prophet, who, it was alleged, were encouraged by the British, but after a few ineffectual conferences Harrison vanquished them at the battle of Tippecanoe (q.v.), Nov. 7, 1811. Upon the outbreak of the War of 1812 he became a major general of Kentucky militia and in August, 1812, was made a brigadier general in the regular army and soon afterward was appointed to the chief command in the Northwest, in which capacity, with the rank, after March, 1813, of major general, he was actively engaged during the Western campaigns of the war, becoming again conspicuous by his brave defense of Fort Meigs (q.v.) and by his complete victory over the British at the battle of the Thames, Oct. 5, 1813. Harrison had thus repeatedly shown marked military talent, and the end of the war left him, next to Jackson, the most prominent military figure in American public life. Withdrawing, however, from the army, Harrison, in July, 1814, negotiated the second Treaty of Greenville, by which the Indians were detached from the British interest. From 1816 to 1819 he was a member of Congress from the district embracing Cincinnati, and from 1819 to 1821 he served in the State Senate. In 1825 he returned to Washington as Senator from Ohio, retaining this position until 1828, when he was sent as Minister to Colombia. Upon returning from that post in the following year, he retired for several years from public life. In 1835 he was nominated for the presidency by Whig conventions in Indiana, Ohio, and Maryland, and by an Antimasonic convention at Harrisburg, Pa., and in the ensuing election succeeded in carrying seven States—Vermont, New Jersey, Delaware, Maryland, Kentucky, Ohio, and Indiana—securing 73 electoral votes, as against 170 given to Van Buren and 51 divided among the three other candidates. Moreover, the popular vote for Harrison in Connecticut, Rhode Island, and Pennsylvania approached very closely, and in Illinois and New York compared favorably with, that of Van Buren. When, finally, the financial policy of Jackson and Van Buren brought such disastrous results as to turn against the administration a large portion of the people, the situation became particularly favorable for whoever might be nominated by the Whig party in 1840. Although in many respects Henry Clay appeared as the leader of the party, he could not command its complete support as a presidential candidate, and accordingly, in the interest of harmony, he refrained from an active contest and left Harrison as the leading candidate for the nomination. The Whig Convention met at Harrisburg, Dec. 4, 1839, and comprised 254 delegates. The "unit rule" was introduced, and upon the first ballot Henry Clay received 103 votes, General Harrison 94, and General Scott 57. On the fifth ballot, during the third day of the convention, Harrison received 148 votes, Clay 90, and Scott 16, and Harrison was accordingly declared the nominee of the party. There forthwith began a political campaign which for popular enthusiasm and widespread activity has probably never been equaled in American politics. Throughout the country meetings, processions, and a great variety of "demonstrations" were held, and the general public took an energetic share in the contest. New campaign methods were introduced, and the log cabin and hard cider became especial emblems of the party of "Tippecanoe and Tyler too." The "stump speaker" was a prominent feature of this new method of campaigning, even General Harrison himself making a series of addresses. The early State elections in some of the New England States and in Ohio and Kentucky resulted in Whig victories, and in the presidential election Van Buren carried only seven States, of which but two were Northern States, with a total electoral vote of only 60, as against the 234 votes secured by Harrison. Although in good health at the time of his inauguration, General Harrison was taken ill, and died on April 4, 1841, the whole political situation being thus suddenly altered, and the Whig President being succeeded by John Tyler (q.v.), a former Democrat. William H. Harrison was the grandfather of President Benjamin Harrison.

Bibliography. Dawson, *A Historical Narrative of the Civil and Military Services of Major-General Harrison* (Cincinnati, 1824); Webster, "William Henry Harrison's Administration of Indiana Territory," in the *Publications of the Indiana Historical Society*, vol. iv (Indianapolis, 1907); Cullum, *Campaigns of the War of 1812–15 against Great Britain* (New York, 1879). For the political conditions under which Harrison was elected President, see Mrs. Coleman, *The Life of John J. Crittenden* (Philadelphia, 1871). For brief biographical sketches, see Bostwick, "William Henry Harrison," in *The Presidents of the United States* (New York, 1894), edited by James Grant Wilson; and Stoddard, . . . *Harrison, Tyler, and . . . Polk* (New York, 1888). A few of Harrison's letters are printed in the *Quarterly Publications of the Historical and Philosophical Society of Ohio*, vols. ii and iii (Cincinnati, 1907–08), and in the *Transactions* of the same society is Harrison's "Discourse on the Aborigines of the Valley of the Ohio."

HARRISON, William Pope (1830–). An American Methodist Episcopal clergyman and editor, born in Georgia. Entering the ministry of the Methodist Episcopal Church South, in 1882 he was elected book editor of his denomination, and in 1886 he undertook also the editorship of the *Methodist Quarterly Review.* He continued to serve in both positions until 1895, when he was succeeded by Dr. John J. Tigert. He edited the *Journal* of the general conference for 1882, 1886, 1890 (he was secretary in 1890 and 1894), and also the book of *Doctrines and Discipline* for 1886 and 1892. He is author of *Methodist Union* (1892); *The Gospel among the Slaves* (1893); *The High Churchman Disarmed; The Living Christ; Lights and Shadows of Forty Years.*

HAR′RISONBURG. A town and the county seat of Rockingham Co., Va., 122 miles northwest of Richmond, on the Baltimore and Ohio, the Chesapeake Western, and the Southern railroads (Map: Virginia, F 3). It is in the picturesque and fertile Shenandoah valley, is of considerable importance as the commercial centre for this region, carrying on a large trade in fruit, live stock and poultry, and has foundries and machine shops, a tannery, planing mills, an incubator factory, flouring mills, etc. The town contains a State normal and industrial school for women and a hospital. The water works and electric-light plant are owned by the municipality. Pop., 1900, 3521; 1910, 4879.

HAR′RISONVILLE. A city and the county seat of Cass Co., Mo., 45 miles south by east of Kansas City, on the Missouri Pacific, the Missouri, Kansas, and Texas, the Kansas City, Clinton, and Springfield, and the St. Louis and San Francisco railroads (Map: Missouri, B 3). It is in an agricultural and dairying region and has fine county and Federal buildings. There are some manufactures. The light plant is owned by the city. Pop., 1900, 1844; 1910, 1947.

HARRISSE, ȧ′rēs′, Henry (1830–1910). A French bibliographer and historian, born in Paris, of Russian-Hebrew parentage. Through long years of investigation in the archives of different European countries he was enabled to collect material for such works as *Bibliotheca Americana Vetustissima* (1866), a bibliography of publications about America from 1492 to 1551, invaluable to modern students of that period. M. Harrisse prepared perhaps the best biography yet published of Columbus, made a uniquely important collection of the early maps of America, and while shut up in Paris during the siege of 1870 compiled *Notes pour servir à l'histoire, à la bibliographie et à la cartographie de la Nouvelle-France et des pays adjacents* (1872). He published also: *Fernand Colomb, sa vie et ses œuvres* (1872); *Les Colombs de France et d'Italie* (1874); *Christophe Colomb, son origine, sa vie, ses voyages, sa famille* (1884–85); *Jean et Sébastien Cabot* (1882); *Les Corte-Real* (1883); *Excerpta Colombiniana* (1887); *Découverte de l'Amérique du Nord* (1892); *Autographes de Christophe Colomb* (1893); *Découverte de Terre-Neuve* (1900). The *Catalogue des livres, des documents, et des manuscrits de Henry Harrisse, bibliographe et historien de l'Amérique* (Paris, 1912) is most valuable. Consult also Henri Cordier, *Henry Harrisse* (ib., 1912).

HAR′ROD, Benjamin Morgan (1837–1912). An American engineer. He was born in New Orleans, La., and graduated from Harvard College in 1856. During the Civil War he was lieutenant of artillery and captain in the engineer corps of the Confederate army. He was chief State engineer of Louisiana in 1877–80, member of the United States Mississippi River Commission from 1879 to 1904, city engineer of New Orleans in 1888–92, and had charge of the city drainage system from 1895 to 1902. He served as a member of the Panama Canal Commission from 1904 to 1907.

HAR′RODSBURG. A city and the county seat of Mercer Co., Ky., 82 miles by rail southeast of Louisville, on the Southern Railway

(Map: Kentucky, F 4). It is a summer resort, visited for its mineral springs, and has a public library, an historical museum, and Beaumont College for women, opened in 1894. There are buggy factories, screen-door and window works, a large distillery, flour mills, planing mills, and other industrial establishments. Harrodsburg adopted the commission form of government in 1914. The water works and electric-light plant are owned and operated by the city. Pop., 1900, 2876; 1910, 3147. Harrodsburg was founded in June, 1774, by James Harrod, and is the oldest permanent settlement in the State. In 1776, when Kentucky was organized as Fincastle County of Virginia, Harrodsburg became the county seat. It was incorporated in 1875. Consult an article, "Kentucky's Pioneer Town," in *New England Magazine*, vol. xiii (Boston, 1891).

HAR'ROGATE. A fashionable and exclusive inland watering place and municipal borough in the West Riding of Yorkshire, England, 18 miles north of Leeds (Map: England, E 2). Its importance dates from the discovery of its chalybeate, sulphur, and saline springs in 1596. The town consists of High and Low Harrogate, connected by rows of handsome residences encircling a public park of 200 acres known as the "Stray." The royal baths and springs, with their fine buildings, the electric-lighting plant, water works, markets, and a remunerative sewage farm are the property of the municipality, which maintains a free library, the Royal Spa concert rooms and gardens, winter garden, theatre, and recreation grounds. The sumptuous new baths (1897), erected at a cost of $500,000, and the Kursaal (1903), costing $350,000, also belong to the town. Pop., 1901, 28,400; 1911, 33,706. Consult Grainge, *History of Harrogate* (London, 1882).

HAR'ROW (AS. *hearge*, Dutch *hark;* connected also with Icel. *herfi*, harrow; possibly akin to Skt. *kharj*, to scratch). An agricultural implement, used for smoothing and pulverizing plowed land, for covering seeds, destroying weeds, and producing a dust mulch to conserve moisture. In its more common form it consists of a frame of a triangular, square, or rhombic form, in which are fixed rows of teeth, or tines, projecting downward. The harrow was in use before the dawn of history; but since only the lighter soils were cultivated in ancient times, it often consisted of bushes, or branches of trees, which merely scratched the ground. The square or oblong harrow derived from the Romans was the form most commonly used until late in the sixteenth century, and that and the triangular, or A, form are still used to some extent. In the various stages of its development the harrow has consisted of a wooden frame with wooden teeth, a wooden frame with iron teeth, or wholly of iron. The second is still used to a considerable extent, but iron harrows are most commonly employed. Modern harrows may be classed as (1) smoothing, (2) spring tooth, (3) curved knife and pulverizing, (4) disk. The disk harrow, which pulverizes the soil by a series of obliquely set revolving disks, represents, in its various modifications adapted to many different purposes, perhaps the highest development of the modern harrow.

HARROW. See HARROW-ON-THE-HILL.

HAR'ROWBY, DUDLEY FRANCIS STUART RYDER, third EARL OF (1831–1900). An English politician, born at Brighton. He was educated at Harrow and Oxford and took an Eastern sojourn, followed by military service at home during the Crimean War, but entered Parliament in 1856 for Lichfield, and while Viscount Sandon sat for Liverpool from 1868 to 1882. He succeeded to his father's title in 1882 and became prominent in matters relating to education and social reform brought before the House of Commons. Under the Conservative government he held such offices as President of the Board of Trade (1878–80) and Lord Privy Seal (1885–86).

HAR'ROW-ON-THE-HILL. A town in Middlesex, England, 12 miles northwest of London (Map: London, C 4). Its celebrity is derived from its famous public school, Harrow ranking hardly second to Eton. The town is finely situated on a hill, 200 feet high, which is conspicuously crowned by the archæologically interesting church of St. Mary with its lofty spire. This church, founded by Archbishop Lanfranc in the reign of William I, was rebuilt in the fourteenth century and has a view of 13 shires. Of late years Harrow has grown very considerably and has become a residential suburb of London. Pop., 1901, 10,200; 1911, 17,074. Consult Rimmer, *Rambles round Eton and Harrow* (London, 1882), and Bushell, *The Harrow Octocentenary Tracts* (Cambridge, 1894).

HARROW SCHOOL. One of the great public schools of England, founded in 1571 by John Lyon (q.v.). Its charter was granted by Elizabeth in the same year, and in 1590 the laws to govern its operation were duly framed by Lyon himself, but students were not admitted until the opening of the first building in 1611. Originally intended for the education of 30 poor youth from the parish of Harrow-on-the-Hill, its statutes nevertheless provided for the admission of "so many foreigners over and above the youth of the parish as the whole number may be well taught and the place can contain." The founder bequeathed two-thirds of his property for its maintenance, but the school did not thrive until 1660, when the head master availed himself of the statute admitting such as lived beyond the parish. This act assured its prosperity, though the enrollment has at times been very low. Now there are more than 600 in attendance, the majority being on the classical side. Long purely classical, the curriculum was extended by the introduction of mathematics in 1837, of modern languages in 1851, of English history and literature in 1869, and subsequently of drawing, music, and science. The school was formerly administered by six prominent parishioners, themselves empowered to fill any vacancies, but by the Public Schools Act of 1868, though the survivors of the old board remained, an additional six were elected, severally, by the Lord Chancellor, the universities of Cambridge, London, and Oxford, the Royal Society, and the undermasters. Students are admitted at the age of 12 to 14. Though free tuition was originally intended, there is now no gratuitous instruction, but the foundationers have some slight advantage of the foreigners in rates. The Lower School of John Lyon was established largely for the purpose of placating the residents of Harrow who objected that the school was not fulfilling the intentions of the founder in receiving only children of the wealthy classes. There are about six entrance scholarships, varying from £30 to £80, and the best of the exhibitions are the three by Baring, of a value of £100 each for five years, to Hertford College, Oxford. To the first building have been added a chapel (1839, replaced by another in 1857), the Vaughan Memorial Library (1861–63), and the hospital (1865). The Tercentenary Lyon Fund has provided a gymnasium, laboratories, and a new speech room (1877). Among the names associated with Harrow the most noteworthy are James Bruce, the African traveler, Charles Buller, Colonel Burnaby, Byron, Calverley, Theodore Hook, Sir William Jones, Cardinal Manning, Merivale, Palmerston, Dr. Parr; Sheridan, Archbishop Trench, Anthony Trollope, and Sir George Trevelyan. Consult: Rimmer, *Rambles round Eton and Harrow* (London, 1882); Thornton, *Harrow School and its Surroundings* (ib., 1885); *Harrow School Register, 1801–93* (ib., 1894); Minchin, *Old Harrow Days* (ib., 1898); Williams, *Harrow* (ib., 1901); Archibald Fox, *Harrow* (ib., 1911); G. T. Warner, *Harrow in Prose and Verse* (ib., 1913).

HARRY, Blind. See Henry the Minstrel.

HARRY AL′LIS. The pseudonym of the French author Jules Hippolyte Percher.

HARRY LOR′REQUER. Charles Lever's first novel and one of his most successful works (1840).

HARSDÖRFFER, härs′dẽrf-fẽr, Georg Philipp (1607–58). A German poet and scholar. He studied law at Altdorf and Strassburg and in 1644, with Johann Klaj, founded at Nuremberg a poetical society usually called the *Orden der Pegnitz Schäfer*, one of several societies established to promote the use of pure German. He was a prolific writer, publishing about 50 volumes in German and Latin. His style is ornate and artificial; his material shows strong influence of Italian and Spanish literature. His works include: *Frauenzimmergesprächspiele* (8 vols., 2d ed., 1642–49), a sort of encyclopædia of curious knowledge in dialogue; *Nathan, Jotham, und Simson*, a collection of fables and allegories; and, his best-known work, *Poetischer Trichter, die deutsche Dicht- und Reimkunst, ohne Behuf der lateinischen Sprache in sechs Stunden einzugiessen* (3 vols., 1647–50). Selections from his poems are in Müller, *Bibliothek deutscher Dichter des 17. Jahrhunderts* (Leipzig, 1826).

HAR′SHA, or **SRĪ-HARSHA-DEVA.** The name of a king of India, known also as Harshavardhana, or Harsha-Silāditya. He reigned over Thaneswar and Kanauj (606–648 A.D.) and was monarch of all northern India, as we know from the Chinese pilgrim Hiouen Thsang (q.v.). He was a noted patron of literature and is named as the author of three Sanskrit dramas: the *Ratnāvalī*, or Pearl Necklace; the *Priyadarsikā*, or Lost Princess; and a play with a Buddhist plot, the *Nāgānanda*, or Joy of Serpents. The question of his actual authorship has often been discussed. It was under his royal favor that Bāna wrote the historical romance, in eight chapters, *Harsha-carita*, or *Adventures of Harsha*, translated into English by Cowell and Thomas (London, 1897). There are English, French, Italian, Swedish, and German translations of the three dramas: *Ratnāvalī*, by Wilson (London, 1871), Cimmino (Naples, 1894), Andersson (Vexiö, 1892), Fritze (Chemnitz, 1878); *Priyadarsikā*, by Strehly (Paris, 1888); *Nāgānanda*, by Boyd (London, 1872), Bergaigne (Paris, 1879), and Cimmino (Palermo, 1903). Consult also: S. Lévi, *Théâtre Indien* (Paris, 1890); Schuyler, *Bibliography of the Sanskrit Drama* (New York, 1906); Ettinghausen, *Harsha Vardhana* (Louvain, 1906); Macdonell, *History of Sanskrit Literature* (London, 1913).

HARSHBERGER, härsh′bẽrg-ẽr, John William (1869–). An American botanist, born in Philadelphia. He studied at Harvard University for a year, but graduated (B.S., 1892; Ph.D., 1893) from the University of Pennsylvania, where he was thereafter a member of the faculty, after 1911 as professor of botany. He lectured in 1904–06, had charge of nature study at the Pocono Pines Assembly in the summers of 1903–08, and was head of the work in ecology at the Marine Biological Laboratory at Cold Spring Harbor, L. I., in 1913. His writings include: *Maize, a Botanical and Economic Study* (1893); *The Botanists of Philadelphia and their Work* (1899); "A Phytogeographic Survey of North America" (1911), in the *Die Vegetation der Erde* series; and also some 150 papers published in scientific journals.

HARS′NETT, Samuel (1561–1631). An English ecclesiastic, Archbishop of York. Born in the parish of St. Botolph, Colchester, Essex, he was educated at Cambridge, and began his career as a preacher in 1584, with a sermon at St. Paul's Cross, London, directed so strongly against the doctrine of predestination that he was then and afterward accused of leaning towards popery. He was Archdeacon of Essex from 1602 until 1604, and the following year was made master of Pembroke Hall, Cambridge, Bishop of Chichester (1609), and of Norwich (1619). He was undoubtedly an extreme high churchman, most arbitrary in his dealings with the subordinate clergy and Puritan laity, but when summoned to appear before the House of Lords and refute the charges of Romanism brought against him, his defense was so eminently satisfactory that he was made Archbishop of York (1628). He is the author of *Considerations for the Better Settling of Church Government* (1629); *A Discovery of the Fraudulent Practices of John Darrell* (1599); and *Declaration of Egregious Popish Impostures, etc.* (1603).

HART (AS. *heort*, *heorot*, OHG. *hiruz*, *hirz*, Ger. *Hirsch*, hart; connected with Lat. *cervus*, Welsh *carw*, Lith. *kárve*, stag, OChurch Slav. *krava*, cow, Gk. κεραός, *keraos*, horned; also related to Lat. *cornu*, Ir., Welsh *corn*, Galatian κάρνον, *karnon*, horn, and to Gk. κέρας, *keras*, Skt. *sṛnga*, horn). A stag or male of the red deer, from the age of six years, when the crown, or *surroyal*, of the antler begins to appear. Great importance was formerly attached to the distinction of names proper to deer at different ages. See Antlers; Deer.

HART, Albert Bushnell (1854–). An American historian, born at Clarkesville, Mercer Co., Pa. He prepared for college in Cleveland, Ohio, and in 1880 graduated at Harvard. He continued his historical studies in Paris, at the Ecole des Sciences Politiques, at the University of Berlin, and at Freiburg, where he received his Ph.D. degree in 1883. In the fall of that year he returned to America to accept an appointment as instructor at Harvard. A year later he became assistant professor, in 1897 professor of history, and in 1910 professor of government. He was president of the American Historical Association in 1909 and of the American Political Science Association in 1912 and was chairman of the executive committee of the National Municipal League in

1910. In 1914 he was appointed exchange professor at the University of Berlin. He identified himself particularly with the introduction and development of the method of studying history from the original sources, both in secondary schools and in colleges, and his influence has been felt throughout the United States. He was an editor of the *Harvard Graduates' Magazine* (1894–1902) and of the *American Historical Review* (1895–1909), and contributed frequently to magazines and reviews. He published: *Introduction to the Study of Federal Government* (1890); *Epoch Maps, Illustrating American History* (1891); *Formation of the Union* (1892, in "Epoch Series"); *Practical Essays on American Government* (1893); *Studies in American Education* (1895); *Revised Suggestions on the Study of History and Government of the United States* (1895); *Guide to the Study of American History*, with Edward Channing (1897; with Channing and F. J. Turner, 1912); *Life of Salmon P. Chase* (1899, in the "American Statesmen Series"); *Foundations of American Foreign Policy* (1901); *Actual Government* (1903); *Essentials of American History* (1905); *Slavery and Abolition* (1906); *National Ideals Historically Traced* (1907); *Manual of American History, Diplomacy, and Government* (1908); *Formation of the Union* (1910); *The Obvious Orient* (1911); *The Southern South* (1911); *The War in Europe* (1914). Professor Hart was editor of *American History Told by Contemporaries* (4 vols., 1898–1901); the *American Citizen Series* (7 vols., 1899–); *Source Readers in American History* (4 vols., 1901–03); *The American Nation* (7 vols., 1903–08); and joint editor of *American History Leaflets* (3 vols., 1913) and *Cyclopedia of American Government* (1910–14).

HART, Charles Henry (1847–). An American author, born in Philadelphia. He was admitted to the bar in 1868 and graduated at the University of Pennsylvania the next spring. He practiced law until 1894, after which he gave his attention to literature and art. From 1882 to 1902 he was director of the Pennsylvania Academy of Fine Arts and in 1893 was chairman of the committee on retrospective American art at the World's Columbian Exposition. His numerous publications include: *Bibliographia Lincolniana*, reprinted under the title *Biographical Sketch of Abraham Lincoln* (1870); *Abraham Lincoln's Place in History* (1900); *Edward Savage, Painter and Engraver* (1905); *Who Was the Mother of Franklin's Son?* (1911); *Memoirs of the Life and Works of Jean Houdon* (1912), in collaboration with E. Biddle.

HART, Ernest Abraham (1835–98). An English physician and reformer, born of Jewish parentage at Knightsbridge, London. He became a student at St. George's Hospital, receiving part of his medical education at Lane's School of Medicine in Grosvenor Place, where he was appointed a demonstrator in his third year. He was admitted to the Royal College of Surgeons in 1856 and was house surgeon at St. Mary's Hospital after being associated with William Coulson in general practice. In 1860 he became surgeon to the West London Hospital, but returned to St. Mary's in 1863, first as opthalmic, then as aural, surgeon, and finally as dean of the medical school.

In 1863 he became coeditor of the London *Lancet*, and in 1866 he was made the editor of the *British Medical Journal*, a position which he filled until his death. He also edited the *Medical Record* from 1873 and the *Sanitary Record* from 1874. He was president of the Harveian Society of London in 1868 and 1893. Hart was, above all, a reformer. In 1854 he led the agitation which compelled the Admiralty to remove naval assistant surgeons from the cockpit to more fitting quarters, in 1888 he made strenuous efforts to ameliorate the position of military medical officers, and in 1892 he called attention to the grievances of Irish dispensary doctors. Sanitary reforms occupied him throughout all his life. His earliest sanitary investigations were carried out in connection with the *Lancet* commission for the nursing of the sick poor in the Metropolitan Workhouse infirmaries. His exposure in 1872 of the evils of the system of baby farming was instrumental in leading to the passage of an act for the protection of infant life. Coffee taverns, the National Health Society, and the abatement of the smoke nuisance in large towns had his strong support. In 1894 he engaged in a campaign against the system of barrack schools, where hundreds of pauper children were herded together till they became subject to chronic diseases and were drilled until they were little better than automata.

His most important publications include: *On Diphtheria* (1859); *On Some of the Forms of Diseases of the Eye* (1864); *A Manual of Public Health* (1874); *Hypnotism, Mesmerism, and the New Witchcraft* (1893 and 1896); *Essays on State Medicine* (1894). He also originated the series of biographies known as *Masters of Medicine*.

HART, Heinrich (1855–1906). A German poet and critic, brother of Julius. He was born in Wesel and was educated in Münster, and began to write while yet a schoolboy. His poems *Weltpfingsten* (1874) are so good that he is sometimes compared with Chatterton. In 1877 he went to Berlin and entered the field of literature. He was soon followed by his brother, who with him published *Die deutschen Monatsblätter*. They struggled to establish a genuine, national school of literature as opposed to the artificial, exotic product of the day. Their criticisms are superior to their poems. Among Heinrich's works may be mentioned: *Das Lied der Menschheit* (incomplete) (1888); *Erinnerungen 1880 bis 1900* (1900); in collaboration with Julius, *Kritische Waffengänge* (1882–84) and *Kritisches Jahrbuch* (1888). Consult Hanstein, *Das jüngste Deutschland* (Leipzig, 1900).

HART, James Morgan (1839–1916). An American philologist and educator, born at Princeton, N. J. He graduated at Princeton University in 1860, studied further at Göttingen, Germany, was assistant professor of modern languages at Cornell from 1868 to 1872, and held the chair of modern languages and English literature in 1876–90 at the University of Cincinnati, Ohio. In 1890 he returned to Cornell as professor of rhetoric and English philology. He became professor emeritus in 1907. His publications include translations from the German and French; very serviceable editions, with brief notes, of Goethe's *Hermann und Dorothea* (1875) and *Faust* (part i, 1878), and Schiller's *Piccolomini* (1875); an informing and interesting work on *German Universities* (1874); *A Handbook of English Composition* (1895); *Essentials of Prose Composition* (1901); and *The Development of Standard English Speech in Outline* (1907).

HART, Joel (1810–77). An American sculptor. He was born in Clark Co., Ky., and received but little education. At the age of 20 he worked with a stonecutter at Lexington, where he began to model busts in clay. The talent which he displayed in clay modeling attracted attention, as did especially his marble bust of Cassius M. Clay, and in 1849 he went to Florence to execute a commission for a statue of Henry Clay, given him by the Ladies' Clay Association of Virginia. His first model was lost during the voyage by shipwreck, and the statue itself, which is now in Richmond, Va., was not completed till 1859. Hart executed two other statues of the same statesman—one of marble, in the courthouse at Louisville, Ky., and a colossal bronze statue at New Orleans. He resided for the most part at Florence, producing many statues and busts. The most important of these are "Angelina," "Il Penseroso," and "Woman Triumphant," which his contemporaries among English critics pronounced one of the finest of modern works. Present-day criticism, however, considers him helpless with the human figure, although his busts are sometimes strong and characteristic, though heavy in execution. He also invented a mechanical device for obtaining the outlines of a head from life, the application of which gave some vogue to his portrait busts.

HART, John (1714–79). A signer of the Declaration of Independence. He was born in Hopewell Township, Mercer Co., N. J., became a farmer, was elected to the Provincial Assembly of the State in 1761 and 1768, and served in the Continental Congress in 1774–76. He was chairman of the New Jersey Council of Safety in 1777–78. During the invasion of New Jersey by the British forces his farm was destroyed, and he was obliged to take refuge in the forests. He was elected to the first Assembly of New Jersey under the new constitution in 1776, and was reëlected in 1777 and 1778.

HART, John Seeley (1810–77). An American educator. He was born in Stockbridge, Mass., graduated at Princeton in 1830, and four years later became adjunct professor of ancient languages there. From 1836 to 1841 he was in charge of the Edge Hill School, Princeton. He was principal of the Philadelphia Central High School from 1842 to 1859 and of the New Jersey State Normal School from 1863 to 1871. In 1872 he became professor of rhetoric and the English language at Princeton. In 1844 he established the *Pennsylvania Common School Journal.* He founded the *Sunday School Times* in 1859 and edited it until 1871, and for a time edited the publications of the Sunday School Union. He also prepared several textbooks, including a *Manual of Composition and Rhetoric* (1870); *Manual of English Literature* (1872); *Manual of American Literature* (1873).

HART, Julius (1859–). A German poet and critic. He was born at Münster and was educated there and at Berlin. In addition to translations from English, American, Spanish, and Persian poets, his publications include: *Sansara* (2d ed., 1887), poems; *Homo Sum* (1890), poems; *Don Juan Tenorio* (1881), a lyrical tragedy; *Der Sumpf* (1885), a tragedy; and, in collaboration with his brother Heinrich, *Die neue Gemeinschaft* (1901); *Geschichte der Weltlitteratur und des Theaters* (1894–96). The last-mentioned work, profusely illustrated, embraces the history of literature from its earliest beginning to the present day.

HART, Sir Robert (1835–1911). A British inspector general and director of the Chinese Imperial Customs Service. He was born at Portadown, Armagh, Ireland, graduated from Queen's College, Belfast, in 1853, and in the next year entered the British consular service in China. In 1858 he was secretary to the Commission of the Allies at Canton and in the following year entered the Chinese Maritime Customs Service as a deputy commissioner. Advanced in 1863 to the post of inspector general, he reorganized the service practically on the lines on which it is now administered. He also organized in connection with the service a fleet of steamers for the suppression of piracy and smuggling and established a splendid system of lighting the coast. A fine postal system, which is now being extended to all parts of the country, was also inaugurated by him. In 1885, when Sir Harry Parkes, British Minister at Peking, died, Sir Robert was asked to succeed him; but, yielding to the entreaties of the Empress Dowager, he declined. He received the highest honors from the Chinese government, among them the Red Button and the decorations of the Double Dragon and the Peacock's Feather. His ancestors were ennobled for three generations, and after the settlement of the Boxer troubles he was appointed to high office in the Imperial government, and the whole Customs Department, native and foreign, was placed in his charge. In 1900 he had about 5000 men under his control, of whom about 900 were foreigners, all chosen and governed in accordance with the strictest civil-service rules. He was with the other foreigners in the British Legation when it was besieged by the Boxers and the Imperial troops. In 1906 much dissatisfaction was aroused by the course of the Chinese government in appointing two native superintendents of the customs to whom he was made a subordinate officer. He wrote *"These from the land of Sinim": Essays on the Chinese Question* (London, 1901). For his *Note on Chinese Matters,* dated June 30, 1869, and a discussion thereof, see F. W. Williams, *Anson Burlingame and the First Chinese Mission to Foreign Powers,* appendix iii (New York, 1912).

HART, Samuel (1845–). An American Protestant Episcopal clergyman, born at Saybrook, Conn. He graduated at Trinity College in 1866, after 1868 taught at that institution, and was made professor of Latin in 1883. He was ordained priest in 1870, and in 1893 he was elected Bishop of Vermont, but declined the office. In 1886 he became custodian of the *Standard Prayer-Book* of his church, and in 1892 secretary of the House of Bishops. In 1899 he became vice dean and professor of doctrinal theology and the Prayer-Book, and in 1908 dean, at the Berkeley Divinity School. He was elected president of the American Philological Association in 1891. He published editions of Juvenal (1873) and Persius (1875); edited Bishop Seabury's *Communion Office* (1874) and *Historical Sermons of Bishop Seabury* (1883–86); and wrote on *The Book of Common Prayer* (1910) and *Faith and the Faith* (the Bohlen lectures, 1914).

HART, William (1823–94). An American landscape and animal painter. He was born in Paisley, Scotland, and was brought by his parents to Albany, N. Y., in 1831. Here he was apprenticed to a coach maker, for whom he painted carriage decorations. He then painted portraits, and first exhibited at the National Academy in 1848. His work being favorably received, he went to Scotland in 1849, studying and painting for three years; on his return to New York he opened a studio, and was elected a member of the National Academy in 1858. In 1865 he was elected president of the Brooklyn Academy of Design, and he was also president of the American Society of Water-Colorists from 1870 to 1873. His art is in the manner of the Hudson River school (q.v.). He preferred landscapes bright in color, autumn or sunset scenes, nearly always with cattle. Among his principal works are: "Peace and Plenty" (1855); "Lake in the Hills" (1858); "White Mountains," owned by C. B. Warren, Philadelphia; "Joy of Autumn" (1865); "Golden Hour" (1872); "Keene Valley" (1875); "Jersey Cattle" (1879); "Hillside Pasture" (1880); "Path by the River"; "Group of Cattle"; "After a Shower." He is represented in the Metropolitan Museum, New York, by "Scene at Napanoch" and "Adirondack Lake, Morning."

His brother and pupil, JAMES McDOUGAL HART (1828–1901), landscape and animal painter, was born at Kilmarnock, Ayrshire, Scotland, and came to America in 1831. He studied also with Schirmer, at Düsseldorf, in 1851. He established a studio in New York and was elected member of the National Academy in 1859. His favorite subjects resemble his brother's, both in style and subject. Among his principal works are: "On the Croton"; "Summer on the Bouquet River"; "Morning in the Adirondacks"; "Summer Memory of Berkshire": "Adirondacks" (1858), Walters collection, Baltimore; "Through Dust Clouds" (1879); "Princess Lily" (1882); "Boughs for Christmas"; "In the Old Orchard"; "Oaks in Autumn." Consult Tuckerman, *Book of the Artists* (New York, 1847).

HART'BEEST (Boer Dutch *hartebeest*, hartbeast, from *harte*, Dutch *hart*, hart + *beest*, beast). A large antelope of South Africa, the type of a genus (*Bubalis*, or *Alcelaphus*) containing several similar species, all African except one, the titel (see BUBALIS), which also inhabits Arabia and Syria. The genus is characterized by its long, pointed head terminating in a narrow muzzle, ringed, compressed, and often lyrate horns, and a comparatively short, cowlike tail. As is the case with most antelopes of the plains, the fore quarters are heavy and higher than the hind quarters, which are narrow and drooping. The reverse is the case with the bush bucks and others inhabiting a bushy or forested country.

The typical or common hartbeest (*Bubalis cama*) formerly ranged from Cape Colony to Mashonaland and gathered in great herds, but it has been slaughtered until now it is found only in remote regions. It stands about 4 feet high at the withers, and is grayish brown, with a yellowish patch on the buttocks and black markings on the face. The heavily ringed, divergent horns are bent sharply back at the tips. The animal was noted among hunters as one of the swiftest of African antelopes and easily distanced greyhounds. Near the Victoria Nyanza lives a similar but pale-faced species (*Bubalis jacksoni*). German and British East Africa and western Abyssinia are the home of three reddish species having widely expanding horns, and these are still fairly numerous there on the bushy plains. One is the red, or Coke's, hartbeest (*Bubalis cokei*), another the tora (*Bubalis tora*), and the third Swayne's, or the "sig" (*Bubalis swaynei*). Sir H. Johnston found the first named extremely numerous in the plains about Kilimanjaro in 1885.

The konzi (*Bubalis lichtensteini*), of all the Zambezi region and Nyassaland; Hunter's hartbeest (*Bubalis hunteri*), of the Tana River valley, marked with a conspicuous white chevron on the forehead; the black-faced korrigum (*Bubalis senegalensis*), of the whole Sudan; and the large Tunisian hartbeest (*Bubalis major*), of the western Sahara, are allied species of the North. In South Africa there formerly ranged in great herds, and still sparingly exist, three other well-known species. One, the sassaby, or bastard hartbeest (*Bubalis lunata*), was one of the most numerous and well-known antelopes of the plains of Cape Colony and northward; it is about 3 feet, 10 inches high, and dark purplish red, nearly black, on the face and along the spine. Like all of this group, their flesh is excellent food. The blesbok (*Bubalis albifrons*) and bontebok (*Bubalis pygargus*) are smaller and remarkable for their brilliant purple-red color and white legs, and each has a white blaze on the face. In the bontebok this mark continues to the base of the horns, while in the blesbok it is divided by a dark crossbar between the eyes. For a general account, consult Lydekker, *The Game Animals of Africa* (London, 1908), and Roosevelt, *Life Histories of African Game Animals* (New York, 1914). See ANTELOPE, and Plate of ANTELOPES.

HART'-DYKE', SIR WILLIAM (1837–). An English politician, born in Kent. He was educated at Harrow and at Christ Church, Oxford, entered Parliament in 1865 for West Kent, sat for the same constituency from 1868 to 1885, and for the Dartford Division of Kent from 1885 to 1906. He was a Conservative Whip (1868–74), Chief Secretary for Ireland (1885–86), and Vice President of the Council on Education (1887–92).

HARTE, härt, FRANCIS BRET (1839–1902). An American humorous poet and novelist, born at Albany, N. Y., Aug. 25, 1839. At 15 he wandered to California, where he spent three years digging for gold and teaching school. In 1857 he entered the office of the *Golden Era* as a compositor and presently began to write for that paper sketches which attracted favorable notice. He became its assistant editor and soon afterward editor in chief of the *Weekly Californian*, in which he published his parodies of novels. Meanwhile, from 1864 to 1867, he was secretary of the United States Mint in San Francisco and was writing for newspapers poems that won him great popularity, e.g., "The Society upon the Stanislaus." His *Condensed Novels* appeared in 1867. From 1868 till 1870 he edited the *Overland Monthly*, which he had helped to organize, and in it he published *The Luck of Roaring Camp* (1868) and *The Outcasts of Poker Flat* (1869)—perhaps his best short stories—and also many others. His most popular poem, "Plain Language from Truthful James," better known as "The Heathen Chinee," made Bret Harte famous in 1870. In this year he was made professor of recent literature in the University of California, but he went to New York in 1871 to continue writing. After 1878 he held consular appointments at Crefeld in Germany (1878–80), at Glasgow, Scotland (1880–85), and after 1885 he lived in England. During the last years of his life he had his home near London, and a new volume, chiefly of short stories, appeared nearly every year. He died in Camberley, near London, May 5, 1902.

Of those American authors whose charm lies mainly in their manner of emphasizing the characteristics of a highly flavored community, Bret Harte is one of the best. He was open-eyed and sympathetic in his delineation of adventurers. His story of the gambler who sacrificed himself for his snow-bound companions bears witness to Harte's first-hand acquaintance with perverse humanity. All his strongest tales of the Forty-niners and of their followers give a view of early California that, in spite of an exaggeration perceptible to contemporary Californians, supplies an interesting supplement to formal history. Whether he tells of the rough Caucasian or of the mysterious Asiatic, Bret Harte has the knack of catching representative traits so admirably that we can see the whole of an almost lawless society. The stuff of his stories was romantic, melodramatic, and mostly disreputable. He handled it with humor, irony, pathos, or with a cynical lack of a superior point of view. In method he was realistic. He was imaginative in that he could cull the essence of things, but he was neither a dreamer nor a thinker. What was close to him he saw marvelously, and few writers have ever given a more distinct impression of being a part of what they have described. To Dickens he owed much, yet Bret Harte is as impersonal as Maupassant. He assumes no responsibility, preaches no sermon, for his whole mind is absorbed in the portrayal of facts. The facts he coördinates with the genius of a born story-writer. Visible physical nature, wild cañons and mountains furnish him a setting. But Bret Harte admits nature only as a background. He loves the dazzling, the spectacular, and the dreadful in his *dramatis personæ*, and delights in laying bare to the eyes of the astonished reader elements of heroism in the sorriest human types—the gambler, the desperado, the adventurer, or the bedraggled woman. And these characters constitute a gallery of vagrants, sordid unfortunates, or downright rogues. Bret Harte wrote and wrote abundantly till the end. In his early work one may feel a quick intelligence, keenly interested in a new world. He is, through his subjects, and perhaps through his manner, an American author otherwise than by mere birth. His American qualities endeared him not only to his readers at home, but to many in Europe, for Europeans found in him an artistic portrayal of a phase of American life.

Most of Bret Harte's stories and poems depict life on the Pacific slope in the early days, but he describes life also in the Atlantic States and in England. Notable among his works, most of them published in London as well as in America, are: *Condensed Novels* (1867); *The Luck of Roaring Camp and Other Sketches* (1870); *Poems* and *East and West Poems* (1871); *Poetical Works* (1872); *Tales of the Argonauts* (1875); *Gabriel Conroy* (1876); *The Story of a Mine* (1878); *The Twins of Table Mountain* (1879); *Flip* (1882); *In the Carquinez Woods* (1884); *On the Frontier* (1884); *Snow-Bound at Eagle's* (1885); *A Millionaire of Rough and Ready* (1887); *The Argonauts of North Liberty* (1888); *A Sappho of Green Springs* (1891); *Sally Dows and Other Stories* (1893); *In a Hollow of the Hills* (1895); *Clarence* (1895); *Three Partners* (1897); *From Sandhill to Pine* (1900); *Under the Redwoods* (1901); and *Stories, Poems, and Other Uncollected Writings of Bret Harte* (1914), compiled by C. M. Kozlay. Consult: Pemberton, *Life of Bret Harte* (New York, 1903); Boynton, *Bret Harte* (ib., 1903); Merwin, *Life of Bret Harte* (ib., 1911).

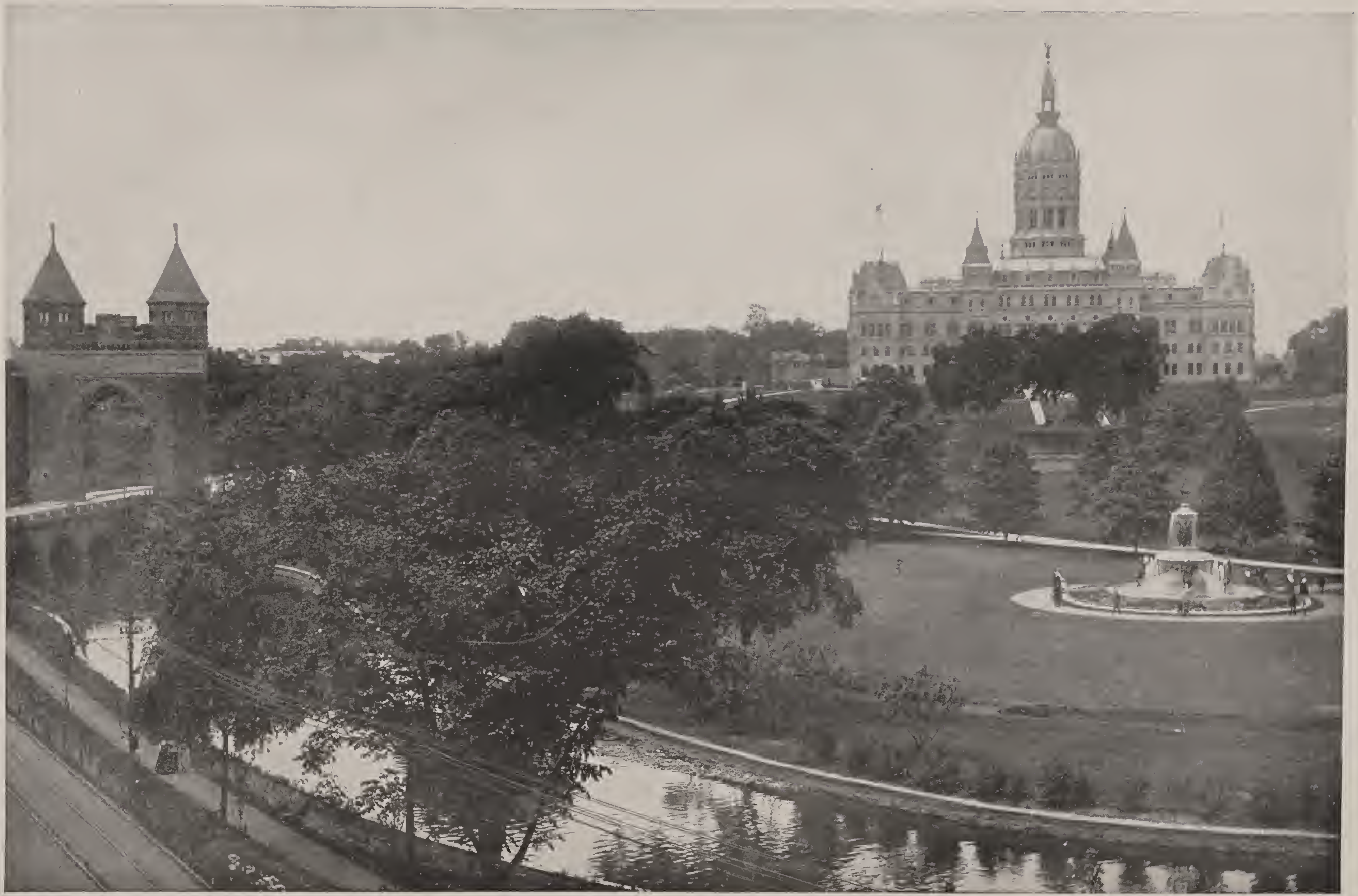
HARTE, Richard Hickman (1855–). An American surgeon. Born at Rock Island, Ill., in 1878 he graduated M.D. from the University of Pennsylvania, where he was appointed associate professor of surgery in 1902. He served as surgeon of a number of Philadelphia hospitals, was a president of the Philadelphia Academy of Surgery, and in 1910–11 was president of the American Surgical Association, whose *Transactions* he had edited for nine years. He contributed to surgical journals and is author of a *Hand-Book of Local Therapeutics* (1893).

HARTE, Walter (1709–74). An English poet and historian. Educated at Marlborough and Oxford, he entered the Church, was preacher and teacher at his alma mater, and became vice principal of St. Mary Hall. His first poems, published at the age of 18, brought him the notice of Pope, whose stanch friend he afterward became, and also his imitator in an *Essay on Reason* (1735). From 1745 to 1749 he was traveling tutor to the recipient of the famous Chesterfield Letters, and on his home-coming was made canon at Windsor and afterward rector in a Cornwall parish. His most pretentious work, the *Life of Gustavus Adolphus* (2 vols., 1759), was a mine of information. He wrote also *Essays on Husbandry* (1764), approved by both Lord Chesterfield and Dr. Johnson; and he was responsible for a number of religious poems.

HARTEBEEST. See Hartbeest.

HARTEL, här′tel, Wilhelm von (1839–1907). An Austrian classical scholar. He was born at Hof in Moravia and studied at Prague and at the University of Vienna. He was appointed professor of classical philology at Vienna in 1872, made a member of the Vienna Academy in 1875 and of the Berlin Academy in 1893, and became a life member of the Austrian House of Peers in 1890. In 1899 he was for a short time Minister of Education and Public Worship, to which post he was reappointed in 1900, holding office until 1905. His principal works are: *Homerische Studien* (1871; 2d ed., 1873); *Demosthenische Studien* (1877–78); *Studien über attisches Staatsrecht und Urkundenwesen* (1878); and various editions of classical authors, including the *Breviarium* of Eutropius (1872); Cyprian's *Opera Omnia* (3 vols., 1868–71); and Ennodius' "Opera" for the *Corpus Scriptorum Ecclesiasticorum*, published by the Vienna Academy of Sciences. He wrote especially on the prosody of Homer and on the use and neglect of the digamma in the *Iliad* and the *Odyssey* and worked also with distinction in the field of Greek epigraphy. He was made editor of the *Zeitschrift für Oesterreichische Gymnasien* in 1874 and with Schenkl founded the *Wiener Studien* in 1879. Consult Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

HARTENSTEIN, här′ten-stīn, Gustav (1808–90). A German philosopher and author, born at Plauen, Saxony, and educated at Grimma and Leipzig, where in 1834 he was appointed assistant and in 1836 full professor of philosophy.



CAPITOL

CONNECTICUT CAPITOL AT HARTFORD; SOLDIERS' MEMORIAL ARCH ON LEFT

He was one of the most gifted followers of Herbart, to whose philosophical views he gave wide extension in the works entitled *Die Probleme und Grundlehren der allgemeinen Metaphysik* (1836) and *Die Grundbegriffe der ethischen Wissenschaften* (1844).

HART′FORD. A city and port of entry, the capital of Connecticut, and the county seat of Hartford County, 125 miles west by south of Boston, 36 miles north-northeast of New Haven, and 110 miles northeast of New York, on the New York, New Haven, and Hartford and the Central of New England railroads (Map: Connecticut, E 2). It is situated at the head of navigation for large vessels on the Connecticut River, 50 miles from Long Island Sound, and at the mouth of Park River, a narrow stream that flows through the city, being crossed by several bridges. Hartford has a fine site, its more elevated sections commanding splendid views of the Connecticut valley, and is regularly laid out over an area of about 17 square miles. Much historical interest attaches to the city, the memory of its prominence in Colonial as well as in later times being preserved in several of its churches and houses, in its localities, and in its interesting collections of relics. The old State House (1796), in which the Hartford Convention (q.v.) met, now serves as the city hall; and the Capitol, costing $2,532,000, is a large and beautiful structure of white marble, with portraits and statues of famous persons. Several of the life and fire insurance companies for which Hartford is noted occupy fine offices, and among other pretentious buildings are the new municipal building (costing $1,400,000), the high school, Young Men's Christian Association building, State arsenal, post office, Wadsworth Athenæum, Junius Spencer Morgan Memorial, the Colt Memorial and the church of the Good Shepherd, both erected by the late Mrs. Samuel Colt, and St. Joseph's Cathedral, the seat of the Bishop (Roman Catholic) of Hartford. Among the charitable institutions are the Tuberculosis, Hartford, City, and St. Francis hospitals, Hartford Orphan Asylum, Old People's Home, Retreat for the Insane, American Asylum for the Deaf and Dumb, the Church Home (Episcopal), and Asylum for the Blind. Hartford is the seat of Trinity College (q.v.), established in 1828, and of the Hartford Theological Seminary (Congregational), founded in 1834. Besides the libraries of the educational institutions mentioned above, there are the State, Public, Watkinson, and Historical Society libraries, aggregating more than 160,000 volumes. The city has a number of parks: Bushnell Park (46 acres), the site of the State Capitol, and Charter Oak Park, famous for its fair grounds and trotting track; also Keney, Elizabeth, Pope, Riverside, Goodwin, Colt, and other parks.

In 1887 Hartford was made a port of entry. The city has considerable commercial importance, but is most widely known as the centre of vast insurance interests and for its manufacturing concerns. The principal manufactures are electrical appliances, firearms, typewriters, screws, nails, pins, envelopes, steam boilers and engines, machinery, printing presses, car wheels, hosiery, knit goods, furniture, carriages, instruments of precision, motor vehicles, etc. The city also controls an extensive trade in Connecticut tobacco. The government, as provided by the charter of 1856, revised in 1914 to go into effect in 1915, is vested in a mayor, elected biennially, and a board of 20 aldermen, with subordinate administrative officials. The government is largely by commissions appointed by the mayor. The park commissioners make appointments to fill vacancies on their own board. The city owns and manages its water works, the earnings from which will pay off the water debt when due. The Nepaug system, now being built, will give the city a supply of water which will last for 50 years. The net debt of the city in 1914 was $5,775,000. The city maintains evening high and common schools, with technical and manual training. The receipts of the city in 1912 amounted to $4,575,000, while the payments were $4,731,074, chief items of expense being $190,000 for police, $243,000 for fire, $626,000 for education, and $91,000 for the water system. Pop., 1800, 5347; 1850, 17,966; 1870, 37,180; 1890, 53,230; 1900, 79,850; 1910, 98,915; 1914 (U. S. est.), 107,038.

In 1624 the Dutch established a trading post on what is still known as Dutch Point and in 1633 erected a fort which they called the House of Hope. A number of Massachusetts colonists, mostly from Newtown (Cambridge), left their homes in 1635 and 1636, partly because of a dispute over the civil rights of non-church members, and, led by their pastors, Thomas Hooker (q.v.) and Samuel Stone, settled at Hartford. The name "Newtown" was at first adopted, but in 1637 it was discarded for "Hartford"—Hertford, England, being the birthplace of Stone. On Jan. 14, 1639, the freemen of Windsor, Hartford, and Wethersfield met at Hartford and, influenced by Hooker, adopted the famous "Fundamental Orders of Connecticut," the first written constitution adopted by a people that ever organized a government. For this reason Hartford is frequently called the "birthplace of American democracy." On Sept. 19, 1650, Peter Stuyvesant and commissioners from the "United Colonies" signed a treaty at Hartford by which boundary disputes were adjusted, and the Dutch confirmed in possession of their fort. In 1654, however, this fort was seized, and the Dutch expelled from Connecticut. In 1687 Governor Andros came to Hartford and made an attempt to seize the Connecticut charter. (See CHARTER OAK.) Washington and Rochambeau met here in 1780 to plan the Yorktown campaign, and in 1814–15 the Hartford Convention (q.v.) was in session here. From the union of the New Haven and Connecticut Colonies in 1644 until 1701 Hartford was the capital of Connecticut; from 1701 to 1873 it shared that honor with New Haven; and since 1875 it has been sole capital. Noah Webster, Henry Barnard, John Fiske, Richard Burton, and Frederick Law Olmsted were born in Hartford, and among the notable writers who have made it their home are Harriet Beecher Stowe, Whittier, Lydia Huntley Sigourney, John Trumbull, Joel Barlow, Horace Bushnell, Charles Dudley Warner, and Samuel L. Clemens (Mark Twain). Consult: *Scaeva* (pseud.), *Hartford in the Olden Time: Its First Thirty Years* (Hartford, 1853); Trumbull, *The Memorial History of Hartford County* (Boston, 1886); W. I. Twitchell, *Hartford in History* (Hartford, 1899); and sketches in Powell, *Historic Towns of the New England States* (New York, 1898), and *Connecticut Magazine*, vol. v (Hartford, 1899).

HARTFORD. A town in Windsor Co., Vt., about 70 miles northwest of Concord, on the

Woodstock and the Central Vermont railroads (Map: Vermont, D 6). It contains three public libraries and has manufactures of woolens, paper, etc. Pop., 1900, 3817; 1910, 4179.

HARTFORD. A city in Washington Co., Wis., 37 miles northwest of Milwaukee, on the Chicago, Milwaukee, and St. Paul Railroad (Map: Wisconsin, E 5). It is in a farming and dairying country and has tanneries, knitting mills, malt houses, automobile works, etc. Near here is Holy Hill, a well-known Catholic monastery, which is under the management of the Carmelite Fathers. Hartford owns its water works, electric-light and sewer plants. Pop., 1900, 1632; 1910, 2982.

HARTFORD, The. The flagship in which Admiral Farragut made his attack on New Orleans, in April, 1862. She was also his flagship in the attack on Mobile.

HARTFORD CITY. A city and the county seat of Blackford Co., Ind., 47 miles west by south of Fort Wayne, on the Lake Erie and Western and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads (Map: Indiana, G 4). It has some natural gas and a steady supply of oil; there are manufactures of paper and pulp, tile, brick, buggies, machines, and various glass articles. The water works are owned and operated by the municipality. Pop., 1900, 5912; 1910, 6187.

HARTFORD CONVENTION. In American history, a political assembly representing the Federalists of the New England States, which met at Hartford, Conn., Dec. 15, 1814, and adjourned sine die, Jan. 5, 1815. Its members numbered 26, 12 coming from Massachusetts, 7 from Connecticut, 4 from Rhode Island (all appointed by the Legislatures of their respective States), 2 from counties in New Hampshire, and 1 from Windham Co., Vt. The convention grew out of the opposition of the Federalists in New England to the War of 1812 and to the Embargo Acts which wrought injury to New England's commerce, and its members all belonged to that party. George Cabot, of Massachusetts, was elected president, and Theodore Dwight, of Connecticut, secretary. The members were as intelligent and as high-minded men as could have been found in the country, but Federalism was exceedingly unpopular, and the fact that the sessions were held with closed doors, and that the members were pledged to secrecy, gave rise to a report that the secession of the New England States was contemplated. The extreme stand thus attributed to the leading Federalists (q.v.), as well as their pronounced opposition to the war, hastened the movement which resulted in the complete overthrow of the Federalist party. The object of the convention was to devise means not only of security and defense against foreign nations, but also for safeguarding the privileges of the separate States against the alleged encroachments of the Federal government; and no treasonable intention could be proved. The act of Massachusetts calling the convention stated that the steps taken by the consulting body were to be "not repugnant to their obligations as members of the Union," and the resolutions of Connecticut and Rhode Island were to the same effect. The main propositions were stated in the form of amendments to the Federal Constitution, which the convention recommended to the several States. The suggested changes were that direct taxes and representatives be apportioned among the States according to the number of free persons therein; that no new State should be admitted to the Union except upon a two-thirds vote in each House of Congress; that Congress should have no power to lay an embargo on ships of American citizens for more than 60 days; that Congress should not interdict foreign commerce or declare offensive war except by a two-thirds vote; that no person thereafter naturalized should be capable of sitting in Congress or of holding any Federal civil office; that no person should serve as President more than one term; and that the President should never be chosen twice successively from the same State. The delegates further resolved that, if their recommendations should not be heeded and if the defense of their respective States should still be neglected, a further convention should be created "with such powers and instructions as the exigency of a crisis so momentous may require." The legislatures of Massachusetts and Connecticut approved of these proposed amendments and sent commissioners to Washington to urge their adoption.

The war, however, was practically over before the convention finished its work, the Treaty of Ghent (q.v.) having been concluded on December 24, though the fact was unknown to the members of the convention. The battle of New Orleans, Jan. 8, 1815, and the ratification of the Treaty of Ghent (February 17) increased the popularity of the government and hastened the downfall of the Federalist party; and "Hartford Convention Federalist" was for many years a term of reproach. The controversy over the absolute obligation of a governor to respond to the President's call for the militia presented a problem in constitutional law, and in the relations of the States to the Union, which was not fully settled even at the outbreak of the Civil War. For an authoritative and complete work, consult the *History of the Hartford Convention* (New York, 1833), by Theodore Dwight, secretary of the convention; also consult Lodge, *Life and Letters of George Cabot* (Boston, 1877), and Henry Adams, *Documents Relating to New England Federalism* (ib., 1877). See FEDERALISTS.

HARTFORD THEOLOGICAL SEMINARY. Originally founded, 1834, at East Windsor Hill, Conn., as The Theological Institute of Connecticut, it was removed to Hartford in 1865 with change of name and rapidly passed through important devolopments. Mainly under the inspiring leadership of Prof. Chester D. Hartranft, who became the first official "president," the seminary entered the rank of the leading American theological institutions and was one of the pioneers in the reconstruction of theological education. In 1902 affiliation was made with the Hartford School of Religious Pedagogy, which led to wider conceptions of ministerial training. In 1911 the department of missions, which had existed for many years, was formed into a school of missions, which in 1912 became the Kennedy School of Missions, in memory of the late John Stewart Kennedy, of New York. In April, 1913, a new charter was granted by the State of Connecticut which provided for the operation of the three schools named above, and any other schools of training for religious service which the board of trustees might decide to establish, under the corporate name of The Hartford Seminary Foundation. The splendid Newton Case Memorial Library, undoubtedly one of the greatest theological libraries in America, contains over 100,000 volumes and nearly 60,000 pamphlets, and includes important collections in Arabic, Indian, Chinese, and Japanese. The main buildings are Hosmer Hall (1870) and Case Memorial Library (1892). In October, 1914, the Theological Seminary had 14 professors, 76 students; the School of Religious Pedagogy, 5 professors, 62 students; the Kennedy School of Missions, 5 professors, 37 students. These lists do not include the instructors and lecturers and correspondence students.

HARTIG, här′tĭk, Franz, Count (1789–1865). An Austrian statesman. He held a number of important posts under the government, having been the Governor of a province and Finance Minister in the royal cabinet. The appearance of his book, *Genesis der Revolution in Oesterreich* (3d ed., 1851), describing the beginning of the liberal movement in Austria, forced him into retirement. In 1860 he was elected to the Reichsrat, where he played a prominent part as a member of the Liberal Centralist party. In 1861 he was called to the Austrian House of Lords, of which he remained a member until his death.

HARTIG, Georg Ludwig (1764–1837). A German forester. He was born at Gladenbach, and in 1781–83 studied at the University of Giessen. Entering, in 1786, the service of Prince Solms-Braunfeld at Hungen, he founded a school of forestry which became the model for future institutions of this kind. In 1806 he went, as chief inspector of forests, to Stuttgart and in 1811 was appointed chief of the department of forestry at Berlin. It was due to his firmness that a large part of German wooded territory was not sacrificed to meet the financial exigencies of the time. He wrote in all 31 works, such as: *Anweisung zur Holzzucht für Förster* (8th ed., 1818); *Lehrbuch für Förster* (11th ed., 1877); *Lehrbuch für Jäger* (11th ed., 1884); *Kubiktabellen* (10th ed., 1871).

HARTIG, Robert (1839–1901). A writer on forestry, born at Brunswick, a son of Theodor Hartig (q.v.), and educated at the Collegium Carolinum, of Brunswick, and at Berlin. In 1878 he was appointed professor of forest botany at Munich. The scientific labors of Hartig in the department of vegetable pathology have contributed greatly to the development of that branch of science. Prior to his investigations on the progressive stages of disease in trees, little or nothing had been done in this department of scientific inquiry; so that Hartig may be considered the founder of arboreal pathology. His more important works include: *Die anatomischen Unterscheidungsmerkmale der wichtigern in Deutschland wachsenden Hölzer* (1879; 4th ed., 1898); *Lehrbuch der Baumkrankheiten* (1882; 3d ed., 1900; Eng. trans. by W. Somerville, 1894). In this work the author reviews the development of the study of vegetable pathology; the causes of vegetable disease; the injuries induced by such plants as cryptogams, fungi, and phanerogams; and wounds, and diseases due to conditions of the soil. He also wrote *Die Zerstörungen des Bauholzes* (1885; 2d ed., 1902).

HARTIG, Theodor (1805–80). A German forester and naturalist. He was born at Dillenburg, was educated at Berlin (1824–27), and was successively lecturer and professor of forestry at the University of Berlin (1831–38) and at the Carolinum, Brunswick. His works include: *Die Aderflügler Deutschlands* (1837; 2d ed., 1860); *Vergleichende Untersuchungen über den Ertrag der Rotbuche* (1847; 2d ed., 1851). In collaboration with his father, Georg Ludwig Hartig, he also published the work entitled *Förstliches und naturwissenschaftliches Konversationslexikon*. The eleventh edition of his father's *Lehrbuch für Förster*, the later reprints of which he had revised, was published in 1877.

HART′INGTON. A city and the county seat of Cedar Co., Neb., 60 miles northwest of Sioux City, Iowa, on the Chicago, St. Paul, Minneapolis, and Omaha Railroad (Map: Nebraska, G 2). It is the centre of a farming and stock-raising district and has some manufactures. The water works and gas plant are owned by the city. Pop., 1900, 971; 1910, 1413.

HARTINGTON, Marquis of. See Devonshire, eighth Duke of.

HART′LAND, Edwin Sidney (1848–). An English folklorist, born in Islington and educated at Bristol. He was a solicitor in Swansea from 1872 to 1890, became registrar of the county court, Gloucester, and in 1902 was mayor of Gloucester. In 1906 he was president of the anthropological section of the British Association. His valuable works on folk tales and allied subjects include: *English Fairy and Other Folk-Tales* (1890); *The Science of Fairy Tales* (1890); *The Legend of Perseus* (3 vols., 1894–96); *Primitive Paternity* (2 vols., 1909–10).

HARTLAUB, härt′loup, Gustav (1814–1900). A German ornithologist, born in Bremen, and educated at Berlin, Bonn, and Göttingen. In addition to his contributions on ornithology to Troschel's *Archiv der Naturgeschichte* during a period extending from 1846 to 1871, he published several valuable scientific works, chiefly on the birds of Africa. These include: *System der Ornithologie Westafrikas* (1857); *Beitrag zur Fauna Centralpolynesiens* (jointly with Finsch, 1867); "Die Vögel Ostafrikas" (also with Finsch, in vol. iv of Decken's *Reisen in Ostafrika*, 1870); *Die Vögel Madagaskars und der benachbarten Inselgruppen* (1876).

HARTLEBEN, härt′lā′ben, Otto Erich (1864–1905). A German dramatist, born in Clausthal. He studied law at Berlin, Tübingen, and Leipzig, but gave up law work as early as 1890 to devote himself to literature in Berlin and Munich. He wrote dramas, tales, and lyrics, but is best known for his comedies, whose sunny humor is tinged only now and then with satire. Among his most successful plays are: *Angele* (1891); *Der Frosch: Familiendrama nach Henrik Ipse* (1891), a parody; *Hanna Jagent* (1893); *Die sittliche Forderung* (1897), a parody of Sudermann's *Heimat; Ein wahrhaft guter Mensch* (1899); the cycle of one-act plays, *Die Befreiten* (1899); and finally his tragedy *Rosenmontag* (1900), which won the Grillparzer prize.

HARTLEPOOL, här′t'l-pōōl, or East Hartlepool. An ancient seaport, market town, and municipal borough, in Durham County, England, on a small peninsula in the North Sea, 18 miles east-southeast of Durham (Map: England, E 2). Sea fisheries, iron shipbuilding, marine engineering, cement manufacture, and coal trade are its chief industries. Its principal buildings are the borough hall and St. Hilda's Church of the thirteenth century, with its lofty embattled tower. Its lighthouse is visible 15 miles. A substantial sea wall and esplanade are attractive features on the seaward side. The town maintains a cemetery, markets, and a free public library. The town and port are practically one with West Hartlepool (q.v.). Pop., 1901, 22,732; 1911, 20,618. It was an important harbor in 1171, and its first charter was granted by King John. The port was bombarded by the Germans during the War of 1914, in which a number of lives were lost. See WAR IN EUROPE.

HARTLEPOOLS, THE. A parliamentary borough and port of Durham County, England, comprising the municipalities of Hartlepool (q.v.) and its extension, West Hartlepool (q.v.).

HART'LEY, SIR CHARLES AUGUSTUS (1825–1915). An English engineer and railroad builder. He served through the Crimean War as captain of engineers in the Turkish contingent (1855–56), was engineer in chief of the European Commission of the Danube from 1856 to 1907, and in 1862 was knighted. In 1867 he drew up plans for the enlargement of the harbor of Odessa and won with them the competitive prize of 8000 silver rubles offered by the Emperor of Russia. In 1875 he was a member of the board of engineers appointed by the President of the United States to report on the practicability of J. B. Eads's plan for improving the south pass of the Mississippi River by means of jetties. He was a member of the congress which sat at Paris in 1879 to decide on the best route for a ship canal across the Isthmus of Panama and served the British government as a member of the International Technical Commission on the Suez Canal in 1884–1907. As a consulting engineer, he was employed by several governments, notably on the harbor and river improvements of the Hugli, the harbor of Triest, the Nile Barrage below Cairo, and the harbor of Varna. He received numerous decorations at home and abroad. Among his published works are: *Delta of the Danube* (1874); *Public Works in the United States and Canada; Inland Navigation in Europe; History of the Engineering Works of the Suez Canal; Port Natal* (1897–1903), two reports, with Sir J. Wolfe Barry.

HARTLEY, DAVID (1705–57). A celebrated English philosopher. His father was vicar of Armley in Yorkshire. At 15 he entered Jesus College, Cambridge, and afterward became a fellow of the college. He studied at first for the Church, but dissented from some points in the Articles, and in consequence had to abandon his original intention. He finally chose the profession of medicine, in which he attained considerable eminence. He practiced as a physician successively in Newark, Bury St. Edmunds, London, and Bath, where he died. His chief work, entitled *Observations on Man, his Frame, his Duty, and his Expectations,* was begun when he was about 25 and occupied him for 16 years. It was published in 1749 and was translated into French and German. The first part relates to the constitution of the human mind and is the really important and original part. The second part treats of religion and morals.

His handling of the mind turns throughout upon two theories. The first is called the doctrine of vibrations, or a theory of nervous action analogous to the propagation of sound, the suggestion of which he owed to Newton, of whose writings he was a student. The second theory was that the higher activities of the mind might be explained to a very wide extent by the principle of the association of ideas (see ASSOCIATION OF IDEAS)—a principle far from new in his statement of it, but never before appreciated in anything like the range of its bearings upon the phenomena of mind.

The doctrine of vibrations supposed that when any one of the senses was affected by an outward object, the effect was to set the particles of the nerve in a vibratory motion, which ran along to the brain and produced corresponding vibrations in the cerebral substance. In like manner, when an active impulse proceeded outward to the muscles, the manner of communication along the nerves was of the same kind. He even extended these molecular vibrations to the other tissues. All conscious processes were regarded as having physiological correlations in brain processes. The opposition that immediately manifested itself against this part of Hartley's speculations arose from a mistaken notion that it favored materialism.

As regards the second doctrine of Hartley, the doctrine of association, he is often regarded as the founder of the English school of association, although thinkers before him, among whom were Locke and Hume, had used the principle of association to explain many of the more developed mental contents. Hartley maintains that it is involved in the conversion of our sensations into ideas, and also in the first origin of voluntary power, which he regards as essentially an acquired power. He then treats of the commonly recognized intellectual faculties, memory, imagination, reason, etc. Lastly, the emotions, which he classifies under six heads—imaginative emotions, ambition, self-interest, sympathy, theopathy (the religious sentiment), and the moral sense—may, according to him, be readily seen to be the products of association of certain elementary feelings that unite among themselves and pass into new connections and give birth to complex feelings, under the general law. Many of those explanations would be considered now as faulty or defective; but at the time Hartley's attempt was a great step in advance. In logic he seems to have been the forerunner of the algebraical theory of that science. In addition to the work mentioned above, Hartley published in 1746 *Conjecturæ Quædam de Motu, Sensus et Idearum Generatione.* A biography by his son appeared in the 1791 edition of *Observations.* Consult Bower, *Hartley and James Mill* (London, 1881), and Schönlank, *Hartley und Priestley, die Begründer des Associationismus in England* (Halle, 1882). Consult also the standard histories of philosophy.

HARTLEY, DAVID (1732–1813). An English politician. He studied at Corpus Christi College, Oxford, and afterward entered politics as a Liberal. Among his friends was Benjamin Franklin, whom he met during Franklin's stay in London, and with whom after his departure began a correspondence which continued through the years of the Revolution. He strongly opposed the policy of Lord North's ministry in forcing a war with America and labored to effect an exchange of prisoners, believing that any amelioration of hardships or acts of generosity would tend to lessen the bitter feelings of the combatants. He was a zealous supporter of Rockingham; and this, together with his friendship for Franklin, probably led to his selection as plenipotentiary to sign the treaty of peace with the United States (Paris, Sept. 3, 1783). His writings were nearly all of a political character: *The Budget, Inscribed to the Man who Thinks Himself Minister* (London, 1764); *The Wallet, a Supplementary Exposition of the*

Budget, Inscribed to the Man Who Knows Himself Minister (1764); *Letters on the American War* (1778); "Two Letters from David Hartley, Esq., M.P.," in *Tracts Concerning County Petitions* (1780); *An Address to the Committee of Association of the County of York* (1781). Consult: *Memoirs of Sir Nathaniel William Wraxall, 1772–84* (5 vols., London, 1883); *The Complete Works of Benjamin Franklin*, edited by John Bigelow (New York, 1887–88); Hale, *Franklin in France* (Boston, 1888).

HARTLEY, Jonathan Scott (1846–1912). An American sculptor. He was born in Albany, N. Y., and after working for some time in the studio of E. D. Palmer he spent three years in the schools of the Royal Academy, London, then studied for short periods in Germany, Italy, and Paris, and settled in New York in 1875. He was elected a member of the National Academy of Design (1891) and of the National Sculpture Society. From 1876 to 1884 he was professor in the Art Students' League and from 1879 to 1889 president. Hartley is best known for his portrait busts, executed with much technical skill and remarkable power of characterization. Good examples are: John Gilbert as Sir Peter Teazle (Players' Club, New York); Felix Morris as the Marquis in "A Game of Cards," George Innes (1909), Victor Semper (1908), and Otis Skinner as Colonel Philippe Bridau (1908). Among his public works are: Miles Morgan (Springfield, Mass., 1882); the Daguerre Monument (Washington, D. C.); statues of Ericsson and Alfred the Great (both in New York, the latter on the Appellate Court building); statue of Thomas K. Beecher (1901, Elmira, N. Y.); and the relief on the monument at Saratoga commemorating the defeat of Burgoyne. In later years Hartley produced a number of ideal and genre subjects, such as: "Nature's Sun Dial" (1907); "Fisherman's Luck," "The Joy of Life," "Music" (all in 1910); "Young Hopi Stick Thrower" (1911); "The Cradle of Pan" (1912).

HART′LIB, Samuel (c.1600–c.1670). An English social reformer. He was born at Elbing, West Prussia, of Polish ancestry, and went to London in 1628. He is said to have introduced the earlier writings of Comenius into England (1637 and 1639) and to have taken an active part in the movement for the unification of the various Protestant sects. He was an intimate friend of Milton and is said to have been very charitable. His publications, which are devoted chiefly to educational and economic reforms, include: *Considerations Tending to the Happy Accomplishment of England's Reformation in Church and State* (submitted to Parliament in 1647); *Macaria* (1641), containing the outlines of an ideal state; *The Reformed Husbandman* (1651).

HARTMANN, härt′mȧn, Jakob, Freiherr von (1795–1873). A German soldier, born at Maikammer in the Palatinate. He was trained in the French military institutes of Bonn and Saint-Cyr; in the campaigns of 1814–15, receiving the Cross of Honor; served in the French ranks against the allies, and, having entered the Bavarian army in 1816, rose to be lieutenant general in that organization (1861). As such, he fought against Prussia in 1866. Promoted to be general (1869), he commanded the Second Army Corps of Bavaria in the Franco-German War, during which he captured the fortress of Marsal and took a noteworthy part in the battle of Sedan. Subsequent to the war he retained command of the corps, with headquarters at Würzburg.

HARTMANN, Johannes Franz (1865–). A German astronomer, born in Erfurt. He studied at the universities of Tübingen, Berlin, and Leipzig, was assistant in the observatories of Leipzig, Vienna (Ottakring), and Potsdam, and in 1898 became director at Potsdam and in 1909 of the observatory at Göttingen. His especial field being spectroscopy, in 1906 he invented a valuable spectrocomparator.

HARTMANN, Johan Peder Emilius (1805–1900). A Danish composer, born at Copenhagen. He was one of a family of German-Danish musicians, a grandson of Johan Hartmann the composer, and the son of August Wilhelm Hartmann, who was an organist at Copenhagen (1800–50) and the teacher of his more distinguished son. Young Johan became a teacher in the conservatory in 1827, director in 1840, and royal chapelmaster in 1849. He composed a number of works, among which are the operas: *The Raven, or Brotherly Proof* (1832); *The Golden Horns* (1834); *The Corsairs* (1835); *Little Christina* (1846); music for dramas by Anderson, Oehlenschläger, and Heiberg; song cycles, and instrumental music for piano and violin, etc. From 1839 to 1892 he was president of the Musical Association of Copenhagen. He ranks among the first of Danish composers.—His son, Emil Hartmann (1836–1898), born at Copenhagen, was at first an organist and afterward gave himself entirely to composition. His works consist of ballets, overtures, songs, several operas, and much instrumental music.

HARTMANN, Sir Julius von (1774–1856). A German general, born in Hanover. He served in the Hanoverian artillery against France in the Netherlands (1793–94), and from 1803 in the German Legion, in which, as commander of artillery, he fought under Wellington in the Peninsular campaign and at Waterloo. In 1833 he was appointed to the command of the entire Hanoverian artillery, which he efficiently organized, in 1836 was promoted to be lieutenant general, and in 1850 was retired.

HARTMANN, Karl Robert Edouard von (1842–1906). A German philosopher. He was born in Berlin, Feb. 23, 1842, educated at the school of artillery, and held a commission from 1860 to 1865, when he resigned it because a serious knee trouble, brought on by an accident, made it impossible for him to perform his duties. In 1867 he took his degree at Rostock and returned to Berlin, where he lived thereafter devoted to literary pursuits and doing most of his work in bed while suffering great pain. This circumstance did not, however, diminish his literary activity. The titles of some of his works will show his versatility: *Aphorismen über das Drama* (1870); *Shakespeares Romeo und Juliet* (1875); *Die Selbstzersetzung des Christenthums und die Religion der Zukunft* (1874); *Wahrheit und Irrthum im Darwinismus* (1875); *Zur Reform des höheren Schulwesens* (1875); *Beiträge zur Naturphilosophie* (1876); *Zur Geschichte und Begründung des Pessimismus* (1880); *Die Krisis des Christenthums in der modernen Theologie* (1880); *Der Spiritismus* (1885); *Aesthetik* (1886–87); *Zwei Jahrzehnte deutscher Politik und die gegenwärtige Weltlage* (1888); *Ausgewählte Werke* (1904). His first book, *Philosophie des Unbewussten* (1869; enlarged in later editions; Eng. trans., *The Philosophy of the Unconscious*, 2d ed., New York, 1904), went through edition after edition and gave rise to a very copious controversial literature. Höffding says that, between the years 1870 and 1875, 58 works appeared treating of Hartmann's philosophy. Its peculiar combination of optimism with pessimism is no doubt the cause of its popularity.

In opposition to Schopenhauer (q.v.), Hartmann maintains that idea is indispensable to will. "No one can in reality merely *will*, without willing *this* or *that:* a will which does not will something, is not; only through the *definite content* does the will obtain the possibility of existence, and this content is *idea.* Therefore *no volition without mental object,* as Aristotle said long ago." Against Hegel, whom Hartmann mistakenly conceives as advocating a doctrine of nonwilling idea, he maintains that it is necessary "to recognize will in the idea, whenever the latter displays an outward causality." The world, as being a process, must therefore be the product of will; and as will implies idea, it must be the product of will realizing an idea. But, according to Hartmann, an idea need not be conscious. Indeed, consciousness "cannot at all lie in the idea as such, but must be an accident; which comes to the idea from elsewhere. The action of unconscious will is clearer in itself and appears less paradoxical"; indeed, will must be unconscious if the idea is unconscious. The term "the Unconscious" is used by Hartmann to "designate the united unconscious will and unconscious idea," or the subject of which unconscious will and unconscious idea are the two attributes inseparably united. Will and idea "are not two drawers in the Unconscious, in one of which lies the irrational will, in the other the powerless idea, but they are two poles of a magnet with opposite qualities, on whose opposition the world rests." They "contradict one another as little as, say, the redness and the perfume of the rose." But though thus compatible, "the one is what the other is not (the will is not logical, and the idea not endowed with will)." "The Unconscious," thus defined, is an individual, "an unconscious world soul," which is "simultaneously present and purposively efficient in all organisms and atoms, the bodily life and the human mind." It is one in all space and in all time, space and time being its creations, not its conditions. It can properly be defined as "pure, unconscious (impersonal but indivisible, therefore individual) Spirit," and in accordance with this definition Hartmann says that "our Monism may be more precisely characterized as spiritualistic Monism." Consciousness arises out of the "unconscious" by "the emancipation of the idea from the will." This emancipation of idea from will arises when organized matter suddenly breaks in upon this self-contained peace of the Unconscious and thrusts upon the astonished individual spirit an idea which falls upon it as from the skies, for it finds in itself no will to the idea. The will endeavors to negate the idea, but cannot; and this failure is the cause of pain, which is "the vexation of the unconscious individual mind at the interloping idea." This break-up of the original unity of will and idea is itself the work of "the Unconscious," which "can never err—nay, not even doubt or hesitate"; it "occurs precisely at the most suitable moment, when the whole purpose frame of the world requires it." Indeed, "the world is contrived and guided as wisely and as well as is possible." "The existing world is the best of all possible ones," and yet "it may still be thoroughly bad," its nonexistence may be preferable to its existence. An empirical examination of the facts proves this to be the case. The contrary belief is an illusion of which there are three stages. The childhood of the individual and the race is spent in the illusion that the individual can attain happiness now; the youth of the race (mediævalism) is spent in the belief that happiness is attained by the individual in a transcendent life after death; and the manhood of the race is spent in the illusion that happiness is attainable by others in this world in the remote future. The true view is that of "the final redemption from the misery of volition and existence into the painlessness of nonwilling and nonbeing." But this redemption can be won only by making "the ends of the Unconscious ends of our own consciousness." And as positive happiness is unattainable, the end of the unconscious is the elimination of misery. "When this consummation is achieved, then volition will resolve upon its own noncontinuance, seeing that continuance involves a surplus of misery. This resolve will be a simultaneous common resolve of individuals in whom the larger half of the active Spirit of the universe is manifest." For a survey of the controversial literature on Hartmann's teaching, consult: Plumacher, *Der Kampf ums Unbewusste* (2d ed., Leipzig, 1890); also in general Kober, *Das philosophische System Eduard von Hartmanns* (Breslau, 1884); Drews, *Eduard von Hartmanns Philosophie und der Materialismus in der modernen Kultur* (Leipzig, 1890); id., *E. von Hartmann's Philosophisches System im Grundriss* (Heidelberg, 1902); J. Sully, *Pessimism* (London, 1891); also the standard histories of modern philosophy.

HARTMANN, Moritz (1821–72). An Austrian politician, poet, and novelist, born of Jewish parents at Duschnik, Bohemia. He studied at Prague and Vienna, traveled in Italy, Switzerland, and Germany, and afterward taught in Vienna till 1844, when he felt it wise to leave his native country in order to publish *Kelch und Schwert* (1845), a collection of poems radical in their religious and patriotic sentiment. *Neuere Gedichte* (1847) followed a residence in Belgium and France. He then returned to Austria and was imprisoned, but was freed by the revolution of March, 1848. He became the leader of the German party at Prague, was chosen deputy to the National Assembly at Frankfort, fled from Vienna in time to escape imprisonment, and took part in the "Rump Parliament" at Stuttgart. From 1849 to 1868 he lived in voluntary exile in Switzerland, England, Ireland, and the East, residing longest in Paris, Geneva, and Stuttgart. He was Paris correspondent of the *Kölnische Zeitung* and represented it in the Crimea during the Crimean War. In 1865 he settled in Vienna as one of the editors of the *Neue Freie Presse.* One of his best-known works is a political satirical poem, the *Reimchronik des Pfaffen Mauritius* (1849). He also published volumes of tales (1863–66), under the titles *Novellen* and *Nach der Natur.* Hartmann's select poems were edited in 1874; his collected *Works,* in 10 volumes, 1873–74. Consult Brandes, *Das junge Deutschland* (Berlin, 1899).

HARTMANN, Robert (1832–93). A German anthropologist, born at Blankenburg. He was educated at Berlin, was professor of zoölogy and anatomy at the Academy of Proskau, and in 1867 was made professor of anatomy at Berlin. He wrote: *Reise des Freiherrn A. von Bar-*

nim durch Nordafrika (1863), a description of an expedition in which he had taken part in 1859 and 1860; *Naturgeschichtlich-medizinische Skizze der Nilländer* (1865–66); *Die Völker Afrikas* (1879); *Handbuch der Anatomie des Menschen* (1881); *Der Gorilla* (1881); *Die menschenähnlichen Affen* (1883); and the anthropological part of the report of the cruise of the man-of-war *Gazette.* With Bastian he founded the *Zeitschrift für Ethnologie.*

HARTMANN VON AUE, fȯn ou′*e*. A German poet. See Aue, Hartmann von.

HARTNACK, härt′nȧk, Edmund (1826–91). A German optician, born at Templin, Brandenburg. He worked under Ruhmkorff in Paris and with Oberhäuser, whose establishment he bought. After 1870, when he was forced to leave Paris, he sold the factory and established a new one at Potsdam. He made many improvements in the microscope, especially by his extension of Amici's system of immersion and by his work on the Nicol prism.

HART′NESS, James (1861–). An American mechanical engineer and manufacturer of machinery, born in Schenectady, N. Y., and educated at Cleveland, Ohio. After 1890 he became superintendent, manager, and finally president of the Jones and Lamson Machine Company of Springfield, Vt.; director in other manufactories, and consulting engineer of the Fitchburg Machine Works. He invented about 80 devices, including the flat turret lathe (1891), the Loswing lathe (1904), and the turret equatorial telescope (1909). He became a member of the American Academy for the Advancement of Science, and vice president in 1913–14 and president in 1914 of the American Society of Mechanical Engineers. He published: *The Evolution of the Machine Shop* (1905); *Machine Building for Profit* (1909); *Flat Turret Lathe Manual* (1910); *Human Factor in Works Management* (1912).

HARTOG, här′tŏg, Marcus (Manuel) (c.1850–). A British zoölogist. He was educated at University College, London, and at Trinity College, Cambridge. From 1874 to 1877 he was assistant in the Ceylon Royal Botanic Gardens; then was demonstrator and lecturer in Owens College, Manchester; in 1882–1909 was professor of natural history, Queen's College, Cork; and in 1909 became professor of zoölogy in University College, Cork. Besides technical memoirs, encyclopædia articles, and contributions to the *Cambridge Natural History* on lower forms, he wrote *Problems of Life and Reproduction* (1913).

HARTO′GIA (Neo-Lat. nom. pl., named in honor of John Hartog, an early traveler). A genus of trees, or shrubs, of the family Rutaceæ. *Hartogia capensis,* now known as *Agathosma hispida,* a native of the Cape of Good Hope, is only 10 or 15 feet high, but the trunk is 1 foot to 1½ feet in diameter. The wood, which is hard, fine-grained, close and tough, is much valued as veneer, and when polished is equal to the finest mahogany. The Dutch colonists call it ladlewood, probably from one of the first uses to which they found it convenient to apply it.

HART′RANFT, John Frederic (1830–89). An American soldier and politician, born in Pennsylvania. He graduated at Union College in 1853 and was admitted to the bar in 1859. He was among the first to answer President Lincoln's call for volunteers in the spring of 1861 and took part in the first battle of Bull Run as aid-de-camp on the staff of Gen. William B. Franklin. He then raised the Fifty-first Pennsylvania Regiment, which he led in a brilliant and successful charge at Antietam. He commanded a brigade at Vicksburg, and afterward was with Sherman in the advance to Jackson, Miss. He recaptured Fort Stedman before Richmond, displaying great bravery, for which he was brevetted major general. After the war he was twice chosen Auditor General of Pennsylvania (1865 and 1868), and he served as Governor for two terms (1873–79), during which he reorganized the militia of the State and put it upon a strictly military basis.

HARTS′HORN. A popular name for ammonia water or carbonate of ammonium. The name was given in early pharmacy to the antlers of the *Cervus elaphus.* Its composition is very different from that of persistent horns, as those of the ox, e.g., and is identical, or nearly so, with that of bone. The products of its distillation were formerly much used in medicine, under the titles of oil of hartshorn, volatile salt of hartshorn, spirits of hartshorn, etc.; but they are now replaced by simpler preparations of the active ingredients of these substances, viz., ammonia and carbonate of ammonia. See also Ammonia.

HARTS′HORNE. A city in Pittsburg Co., Okla., 15 miles east of McAlester, on the Chicago, Rock Island, and Pacific Railroad (Map: Oklahoma, F 4). It is in a coal-mining, fruit-growing, and stock-raising region and has a cement plant and briquette factory. The water works are owned by the city. Pop., 1900, 2435; 1910, 2963.

HARTSHORNE, Edward (1818–85). An American physician, born in Philadelphia. He graduated from Princeton University in 1837 and in medicine from the University of Pennsylvania in 1840. In 1843 and again in 1844 he published reports in favor of the separate system of prison discipline, which attracted considerable attention, as they were the first written by one who had had experience with the practical workings of the system. In 1847 he was the secretary of the first prison discipline convention, which met in Philadelphia, and 10 years later acted in the same capacity to the first sanitary convention in the United States.

HARTSOEKER, härt′so͞o-kẽr, Niklaas (1656–1725). A Dutch physicist and histologist, born at Gouda. He early showed a taste for mathematics and physics; studied these subjects without the permission or knowledge of his father, a Reformed clergyman, who wished his son to become a clergyman; and at the age of 18 made a powerful microscope, with which he made striking discoveries regarding spermatozoa. His father finally consented to his going to Leyden, and later to Amsterdam, where he met Huygens and confided to him his discoveries. In 1678 he went to Paris and studied under Cassini; from 1684 to 1696 he lived in Paris and then returned to Holland to become the instructor of Peter the Great. He went to Düsseldorf, in 1704, on the urgent invitation of the Elector of the Palatinate, and was appointed honorary professor at Heidelberg. In 1717, after the Elector's death, he moved to Utrecht, where his continued application to work broke his health. His works include: *Essai de dioptrique* (1694), in which his independent discovery of many of Newton's observations on light appeared, as well as a well-defined theory of general physics; *Principes de physique* (1696), developing this theory; *Con-*

jectures physiques (1707–08); *Cours de physique* (1730).

HART'S-TONGUE FERN. A name applied to ferns of the genus *Scolopendrium*, or *Phyllitis*, as it is sometimes designated. They are large ferns with oblong, strap-shaped leaves or fronds. *Scolopendrium vulgare* is common in Europe and Asia, but, so far as is known, is rare in America, occurring in damp ravines or under limestone cliffs in a few localities in New York, Tennessee, and Canada. The fronds are 10 to 15 inches high and 1 to 2 inches broad, with heart-shaped bases and entire or undulate margins.

HART′SUFF, George Lucas (1830–74). An American soldier, born at Tyre, N. Y. He graduated at West Point in 1852 and served on the frontier and in Florida, where, during a fight with the Seminole Indians, he received a wound which eventually caused his death. In March, 1861, he was appointed assistant adjutant general with the brevet rank of captain and was assigned to duty under Rosecrans in West Virginia. Later he was severely wounded at Antietam and immediately after the battle was made brevet colonel for gallant and meritorious services. On March 13, 1865, he was given the brevet rank of major general in the regular army and from April 3 to May of the same year was in command of City Point and Petersburg. He was mustered out of the volunteer service on Aug. 24, 1865, and resigned from the regular army on June 29, 1871, because of disability resulting from wounds received in battle.

HARTT, Charles Frederick (1840–78). An American geologist, born at Fredericton, New Brunswick. He studied under Agassiz for a number of years and then accompanied him as geologist on an expedition to Brazil in 1865. After his return he was in 1868–75 professor of geology and physical geography at Cornell University, but interrupted his university duties to make three more expeditions to Brazil, where he finally settled in 1875 to enter upon his great work as chief of the geological commission appointed to make a survey of the entire Empire. Scarcely more than two years later, however, he died of yellow fever in Rio de Janeiro, Brazil. His principal publication is *The Geology and Physical Geography of Brazil* (1870). Consult Hay, "The Scientific Work of Prof. Charles Frederick Hartt," in the *Proceedings and Transactions of the Royal Society of Canada*, vol. v (2d series, Ottawa, 1899).

HARTTUNG, Julius von Pflugk. See Pflugk-Harttung.

HART′WELL, Edward Mussey (1850–). An American statistician, born at Exeter, N. H. He graduated from Amherst College in 1873, taught for several years, and studied at Johns Hopkins University (Ph.D., 1881) and at Miami Medical College (M.D., 1882). After acting as director of the gymnasium at Johns Hopkins (1883–91) and director of physical training in the Boston public schools (1891–97), he became secretary of the statistical department of the city of Boston. In 1888–89 he was special agent of the Bureau of Labor in Europe, and in 1906–08 was chairman of the Massachusetts State Commission for the Blind. He served as vice president of the American Statistical Association in 1911–12. Besides preparing numerous pamphlets and articles on his subjects of special study, he translated from the Swedish Kleen's *Handbok i Massage.*

HARTWICH, härt′vĭk, Emil Hermann (1801–79). A German engineer, born at Bensdorf, near Brandenburg. He was inspector of water works in Steinau and commissioner of buildings at Danzig, where he undertook the completion of the moles in the Baltic near Neufahrwasser. He built the bridge over the Rhine at Coblenz and introduced many English methods in German railroads, especially a central-switch apparatus. Among his writings are: *Erweiterungsbauten der rheinischen Eisenbahn* (1864–67); *Denschrift, betreffend die Herstellung einer Eisenbahn welche Berlin durchschneidet* (1872); *Aphoristische Bemerkungen über das Eisenbahnwesen* (2d ed., 1874); and many contributions to the *Zeitschrift für Bauwesen.*

HARTWICH, härt′wĭch, Herman (1853–). An American genre, landscape, and portrait painter. He was born in New York City and studied in the Munich Academy under Professors Diez and Löfftz. After painting portraits in the United States from 1893 to 1896, he made Munich his residence. His art does not differ materially from that of the Munich Secessionists, to which group he allied himself, and is in no sense distinctly American. He devoted himself particularly to subjects from Upper Bavaria and the Tirol. Among his awards are gold medals at Munich, Berlin, and Salzburg, and a silver medal at the St. Louis Exposition (1904). He is represented in the galleries of Leipzig, Stuttgart, Munich, and Cleveland, Ohio.

HARTWICK, or HARTWIG, härt′vĭk, John Christopher (1714–96). A German-American Lutheran clergyman. He was born in Saxe-Gotha and is said to have studied at the University of Halle. In 1745, after having been ordained in the German Lutheran Church in London, he came to America to take charge of the Palatinate Germans settled along the Hudson in New York State. Two years later he assisted at the organization of the First Lutheran Synod in Philadelphia. Besides his work in New York his clerical labors extended also to Pennsylvania, Maryland, Virginia, and New England. In 1754 he obtained the title to 21,500 acres of land in Otsego Co., N. Y., which he had bought from the Indians. This was employed, in accordance with his directions, to establish a theological and classical seminary. This institution, known as the Hartwick Seminary, was opened at Hartwick, N. Y., in 1815. Its theological work was dropped, and it became a classical academy.

HARTWIG, Karl Ernst Albrecht (1851–). A German astronomer, born in Frankfort-on-the-Main. He was educated at Erlangen, Leipzig, Göttingen, and Munich; taught in secondary schools; was an assistant at the Strassburg Observatory; was employed in preparing the results of the German observations of the transit of Venus in 1874; in 1882–83 led the German expedition to Bahia Blanca for the observation of Venus; in 1884 became lecturer at Dorpat; and in 1886 took charge of the building of the Remeis Observatory at Bamberg, opened in 1889, with himself as director.

HARTWIG, Otto Peter Konrad (1830–1903). A German historian, born at Wichmannshausen. He studied theology and linguistics at Marburg, Halle, and Göttingen. From 1860 to 1865 he was preacher and teacher of the German Evangelical church in Messina, Italy. In 1867 he joined the staff of the Marburg University library, from which he went to the University of Halle as librarian in chief, but resigned in 1898. In 1884 he founded, with

Schulz, the *Centralblatt für Bibliothekswesen.* Among Hartwig's works are: *Henricus de Langenstein* (1857); *Aus Sicilien* (1867–69); *Sicilianische Märchen,* collected by Laura Gonzenbach (1870); *Die Uebersetzungslitteratur Unteritaliens in der normannisch-staufischen Epoche* (1886); *Sulla data degli sponsali di Arrigo VI con la Costanza, etc.* (1878), with Amari; *Quellen und Forschungen zur ältesten Geschichte der Stadt Florenz* (1875–80); *Festschrift zum 500-jährigen Geburtstage Gutenbergs* (1900).

HARTZELL, härts′ĕl, Joseph Crane (1842–). An American Methodist Episcopal bishop. Born at Moline, Ill., he graduated from Illinois Wesleyan University in 1865 and from Garrett Biblical Institute in 1868, and entered the ministry in the latter year, having been ordained to the ministry two years earlier. In 1873 he founded and became editor of the *Southwestern Christian Advocate.* He was assistant secretary and secretary of the Freedmen's Aid and Southern Education Society for 14 years. Elected in 1896 Missionary Bishop to Africa (with episcopal residence at Funchal, Madeira), he labored very successfully in opening and building up missions, the latest one opened under his supervision being that among the Moslems in north Africa. He became a close friend of Cecil Rhodes and other African leaders. His writings comprise contributions to religious periodicals.

HARTZENBUSCH, härts′en-bụsh, Juan Eugenio (1806–80). A Spanish dramatist of the Romantic movement, born at Madrid, of a German father and a Spanish mother. He first studied theology and then took to painting, but was forced by his father's illness to follow for some years his father's trade, that of a cabinetmaker, training himself meanwhile for the work of a playwright by preparing versions of domestic and foreign dramas. His success was assured from the time of the first performance of the *Amantes de Teruel,* his best-known production, and one of the most important plays of the Romantic period of Spanish literature in the nineteenth century. Highly sentimental, it brings once more upon the boards a story of sad loves which had already been treated by Artieda, Tirso de Molina, and Montalbán. Later dramas of Hartzenbusch, most of them of an historical nature are: *Doña Mencía* (1838); *Alfonso el casto* (1841); *La jura en Santa Gadea* (1845), dealing with the history of the Cid; *La madre de Pelayo* (1846); *La ley de raza* (1852), relating to the history of the Visigothic Empire; *Vida por honra* (1858), a statement of the tragic love of the Conde de Villamediana; *El mal apóstol y el buen ladrón* (1860), a play with some of the characteristics of the *Auto sacramental.* His comedies of a Moretinian type are: *Un sí y un no; La visionaria; Juan de las Viñas; La redoma encantada; Los polvos de la madre Celestina; Las Batuecas.* Hartzenbusch also published *Ensayos poéticos y artículos en prosa, etc.* (1843), and *Cuentos y fábulas* (1861). He was a lyric poet of but modest pretensions. As editor of the dramas of Lope de Vega, Calderón, and other masters of the *siglo de oro,* he did not possess the proper scientific and critical ability. Associated with the staff of the *Biblioteca Nacional* at Madrid, after 1844, he became its director in 1862 and retained this post till his death. He was made a member of the Academy in 1847. Consult his works in the *Colección de escritores castellanos* (Madrid, 1887 et seq.); Fernández-Guerra's essay on Hartzenbusch in Novo y Colsón, *Autores dramáticos contemporáneos;* and Enrique Piñeyro, *El Romanticismo en España,* pp. 117–137.

HARTZ (härts) **MOUNTAINS.** See Harz Mountains.

HARUERIS. See Haroëris.

HARUN AL-RASHID, hȧ-ro͞on′ ȧl-rȧ-shēd′ (?–809). The fifth of the Abbasside caliphs. He was born either on the 20th of March, 763 A.D., or the 15th of February, 766 A.D., and in 786 succeeded his elder brother, Al-Hadi, in the caliphate. The administration during a considerable part of the brilliant reign of Harun was intrusted to the Grand Vizier Yahya, head of the powerful Barmek (or Barmecide) family; and the energy of the administration, the enforcement of order, and the general prosperity of the country proved that Harun's confidence was not misplaced. Rebellions were suppressed and the integrity of the Empire was preserved, saving the loss of a portion of north Africa occasioned by the rise of the Idrisites (q.v.). The capital, Bagdad, became the most flourishing city of the period. Tribute was paid to Harun from all quarters, and splendid edifices were erected by him at an enormous cost. Harun loved luxury and pleasure, was a patron of learning, poetry, and music, and his court was the resort of the most eminent Mohammedans of the age. He was celebrated in countless songs and narratives and is perhaps best known in the West as the caliph around whom centre the tales of the Arabian Nights. Towards the end of his reign he conceived a hatred towards the Barmecides (q.v.), due, perhaps, to jealousy of their growing influence and power; yet he suffered the reins of government to remain in their hands for some years. In 803 he caused the Vizier, his four sons, and all their descendants, one only excepted, to be executed, not even excepting his favorite Ja'far, who had been his companion in his nocturnal rambles through the streets of Bagdad. The affairs of the Empire felt the change; disorders broke out in every part of the caliphate, and treason and rebellion led to civil war. A formidable insurrection broke out in Khorassan, and Harun marched in person against the rebels. But an attack of apoplexy obliged him to remain behind in Tus, where he soon afterward died, in the month of March, 809. While Harun was an enlightened monarch, he was a thorough Oriental despot, who has been somewhat idealized in popular tradition. Consult: Muir, *The Caliphate* (London, 1891); Osborn, *Islam under the Khalifs of Bagdad* (ib., 1878); Palmer, *Haroun Alraschid* (ib., 1881); Weil, *Geschichte der Chalifen* (Stuttgart, 1846–62); Müller, *Der Islam im Morgen- und Abendland* (Berlin, 1885).

HARUSPEX. See Auguries and Auspices; Haruspices.

HARUS′PICES (Lat., inspectors of entrails). Roman soothsayers. They seem to have come originally from Etruria, whence the Romans derived many of their religious institutions. Their art, (*ars*) *haruspicina,* which in many respects was like that of the augurs (see Auguries and Auspices), consisted in interpreting the will of the gods by inspecting the entrails of the animals offered in sacrifice (hence they are also called *extispices,* from *exta,* entrails, and *specio,* look into) and by observing other circumstances connected with the offerings, such as the willingness or the unwillingness of the victim to come to the altar, the flame, the smoke, etc. They took indications also from earthquakes, lightning, and all other extraordinary phenomena of nature, called *portenta* or *monstra*. The haruspices did not equal the augurs in dignity and respect; they were regarded rather as media of communication with heaven than as possessing any independent religious authority. They had no organization, such as the augurs had; they did not, in earlier times at least, form a *collegium*, nor had they a *magister*. They were, however, at one time considered of great importance; but in later times their art fell into disrepute with the more intelligent portion of the Roman citizens. Some of the later emperors, especially Alexander Severus, endeavored to revive and encourage the art of the haruspices, but it was finally abolished by Constantine. Their sacred books were called *libri haruspicini*, *fulgurales*, and *tonitruales*. Consult: Bouché-Leclercq, *Histoire de la divination dans l'antiquité* (Paris, 1879–82); Clairin, *De Haruspicibus apud Romanos* (ib., 1880); Carter, *The Religion of Numa* (London, 1906); id., *The Religious Life of Ancient Rome* (Boston, 1911); Fowler, *The Religious Experience of the Roman People* (New York, 1911); Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912). See DIVINATION.

HAR'VARD. A city in McHenry Co., Ill., 63 miles northwest of Chicago, on the Chicago and Northwestern Railroad (Map: Illinois, H 1). It contains a public library, a hospital, and a high school, and there are railroad shops and a roundhouse, creameries, hardware factories, cement works, etc. The water works are owned by the city. Pop., 1900, 2602; 1910, 3008.

HAR'VARD, JOHN (1607–38). An English clergyman in New England, the principal founder of Harvard College, born in Southwark, London. His father, Robert Harvard, was a butcher. His mother, who married twice after her first husband's death, became possessed of considerable property, which enabled her to give John Harvard a good education, and he was accordingly sent to Emmanuel College, Cambridge University, where he graduated in 1631, studied theology, and took his master's degree in 1635. In 1637 he married Ann Sadler, the daughter of a clergyman of Sussex, and removed to New England. There he settled at Charlestown, on Massachusetts Bay, where he was admitted a freeman in August, and where he became an assistant pastor of the First Church, of which the Rev. Z. Symmes was in charge. His health soon gave way, however, and he died of consumption on Sept. 18, 1638, after a residence in the Colony of little more than a year. By his will he left his library of 260 volumes and a sum of about £400 to the college at "New Towne," later Cambridge, for which the General Court of the Colony had made an appropriation of £400 in 1636. A year after the young clergyman's death, in commemoration of his benefaction, the name of Harvard was conferred upon the institution. Consult Rendle, *John Harvard* (London, 1885), and H. C. Shelley, *John Harvard and his Times* (Boston, 1907).

HARVARD COLLEGE OBSERVATORY. An astronomical observatory, situated at Cambridge, Mass., in lat. 42° 22′ 47.6″ N. and long. 4h. 44m. 31.05s. W. It was founded in 1843 as a result of the widespread interest in astronomy occasioned by the great comet of that year. Its work is devoted principally to stellar photography and photometry; in 1886, through the generosity of the widow of Prof. Henry Draper, provision was made for carrying on research in stellar spectroscopy. The equipment includes an 8-inch meridian circle; the 15-inch East refractor, used chiefly for photometric observations; the 8-inch and 11-inch Draper refractors for photographic work; a 12-inch meridian photometer; and the 24-inch Draper reflector. Since 1891 a station has been maintained in the Southern Hemisphere at Arequipa, Peru. The two observatories are together able to cover the whole sky, and a magnificent collection of upward of 200,000 negatives has been accumulated, the detailed study of which is carried on at Cambridge by a large corps of assistants. Among the notable discoveries resulting from the examination of these plates were those of the ninth and tenth satellites of Saturn, several *novæ*, and many new variable stars. The 24-inch photographic doublet, presented to the observatory by Miss C. W. Bruce, of New York, was transferred to Arequipa in 1896. Reports of the work of both observatories are published in the *Annals of the Harvard College Observatory*, upward of 70 volumes of which have been issued, and in the annual report of the director. The director in 1914 was Prof. Edward C. Pickering.

HARVARD UNIVERSITY. The oldest institution of higher education in the United States, situated at Cambridge, Mass. It had its inception in a desire of the early settlers of the Colony of Massachusetts Bay to preserve and perpetuate in their new home the classical and theological learning acquired by many of them at the University of Cambridge and to educate the "English and Indian youth in knowledge and godliness." To this end the General Court of the Massachusetts Bay Colony voted £400 in 1636, and in the following year appointed 12 eminent men of the Colony, including Gov. John Winthrop, "to take order for a college at Newtowne," which was afterward renamed Cambridge, in honor of Cambridge University. While the organization of the institution was in progress, Rev. John Harvard, an English nonconforming clergyman, the minister of the church in Charlestown, Mass., died in 1638, bequeathing to the new school his library, consisting of 260 volumes, together with half of his estate, valued at about £400. In recognition of this gift—munificent in those days—the new school was named Harvard College. The Colonial magistrates and many private persons, emulating Harvard's generosity, also contributed books, funds, and gifts in kind. The first building was erected in 1637 by Nathaniel Eaton, who also taught until 1639, when he was dismissed for misconduct. The Rev. Henry Dunster was elected president in 1640, and in 1642 the first class, consisting of nine students, was graduated. The government of the college was the same year vested in a board of overseers, consisting of the Governor, the Deputy Governor, the magistrates, the teaching elders of the "six next adjoining towns" (Cambridge, Watertown, Charlestown, Boston, Roxbury, and Dorchester), and the president of the college. In 1650 the college was formed into a corporation, consisting of the president, five fellows, and the treasurer, for the immediate administration of the financial and educational affairs of the institution, and in 1657 the charter of the corporation was so amended as to dispense with the positive assent of the overseers in matters relating to the internal management of the college, leaving, however, final jurisdiction to that body if necessary. These two governing bodies acted as checks upon each other throughout the earlier history of Harvard, and though at times their antagonism was productive of some good, restraining the too rapid advances proposed by the liberal corporation on the one hand, and preventing the overseers from using the college for partisan purposes, yet the progress of the college was much retarded by these controversies. The character of the board of overseers has been fundamentally changed by successive legislative acts, concurred in by the corporation and overseers. According to the State constitution of 1780 it was composed of the Governor, Lieutenant Governor, Council and Senate of the Commonwealth, the president of the college, and the ministers of the Congregational churches of the towns mentioned above. In 1810, 15 laymen and 15 Congregational ministers, with the President of the Senate and the Speaker of the House, all inhabitants of the State, were substituted in place of the Senate and the ministers of the six towns. In 1814 the members of the Senate were restored to membership; the Act of 1834 made clergymen of all denominations eligible for membership on the board; but it was not ratified by the corporation and overseers until 1843; the Act of 1851 secularized the board by containing no reference to clergymen; the Act of 1865 transferred the election of members of the board from the State Legislature to persons holding the B.A., M.A., or honorary degrees from the college, who were to vote on Commencement Day at Cambridge; in 1880 eligibility to election as overseer was extended to nonresidents of the State. The Act of 1889, accepted in 1902, authorized the president and fellows and the board of overseers to extend the suffrage to the holders of other degrees than B.A. and M.A. Under this act in 1907 the graduates of the Graduate School of Arts and Sciences, and of the Graduate School of Applied Sciences, were granted the right to vote. Nominations are made by postal ballot, and the election is held in Cambridge on Commencement Day.

The administrations of Presidents Dunster, Chauncy, Hoar, and Mather, covering a period of nearly 70 years, were characterized by a constant struggle for existence on the part of the college, due to the parsimony of the government and to the religious controversies of the liberals and orthodox. Rev. Increase Mather actually secured, in 1692, the passage of an act granting a new charter, placing the institution under control of the Calvinists, but the royal sanction to the instrument was withheld. In 1707 the struggle for the control of the college culminated in the reaffirmation of the charter of 1650 by the General Court, the liberals gaining control of the corporation, while the orthodox retained their influence in the board of overseers. In 1721 Thomas Hollis, an English merchant, endowed a divinity chair, expressly stipulating that the incumbent should not be subjected to any particular religious tests. The overseers at first refused to accept the gift; and when, at the instance of the corporation, they finally did accept it, the founder's wishes were disregarded by the exaction of a number of confessions from the first appointee. In 1762 an attempt was made by the orthodox party to establish a rival college in the Colony; but this was stoutly resisted by the overseers, and they succeeded in dissuading Governor Bernard from granting a charter. In 1764 the first Harvard Hall, erected in 1672 and containing the library and apparatus, was burned; of John Harvard's library only a single volume was rescued. Sympathy for the college was awakened throughout the Colonies, which generously aided to repair the loss.

The liberal tendencies of Harvard manifested themselves on the political as well as on the religious side. The class of 1768 voted to take their degrees dressed in homespun, and the degree of LL.D. was conferred upon George Washington in 1776. Throughout the critical period of the Revolution Harvard loyally supported the patriotic cause by converting its funds into currency, whereby its finances greatly suffered. In 1780 the new State constitution confirmed the college charter with slight modifications, and by 1793 the college had entirely recovered from its financial difficulties, its funds being then estimated at $182,000. The college after the close of the Revolution resumed its normal growth; the standard of scholarship was somewhat raised, and in 1782 a Medical School was established. Under President Kirkland's vigorous administration (1810–28) the college grew considerably. At the instance of Prof. George Ticknor, who had studied at Göttingen, a committee, with Hon. Joseph Story as chairman, was appointed to inquire into the methods of discipline and instruction at the college. The committee reported in 1824, recommending the division of the college into departments and the instituting of two classes of studies—those necessary for a degree and those which might be taken by students merely wishing "to pursue particular studies to qualify them for scientific and mechanical employment and the active business of life." These suggestions met with strong opposition from the conservatives. A new code of laws was nevertheless drawn up the following year, organizing the "faculty of the university," systematizing the college administration, creating departments, and admitting special students. This marks the transition period of Harvard from a classical college modeled after the traditions of Oxford and Cambridge to a university based on the principles of European universities. The attempt at expansion, which involved an increase in expenditure, received a temporary check when, in 1824, the Legislature refused to renew the grant of the bank tax, which had netted the college, since 1814, about $10,000 annually. In 1825 the disbursements exceeded the income by about $4000, and the attendance, owing to the enforced economy and the withdrawal of aid from needy students, decreased from over 300, in 1824, to about 200. Nevertheless, the policy of expansion was continued under President Josiah Quincy, private benefactions, as usual, supplying the want of State aid. The Law School, which had been established in 1817, was greatly strengthened by Mr. Nathan Dane's endowment of an additional chair, to which Joseph Story, whose works on equity and constitutional law form an important part of the legal literature of the United States, was appointed. In the modern-language department Professor Ticknor and his successor, Henry W. Longfellow, successfully offered a number of elective courses, but in other departments the attempt gradually to introduce electives did not meet with equal success. It has always been Harvard's tendency to encourage freedom of thought, and on that account it was formerly considered the nursery of Unitarians. The Harvard authorities, however, were timorous, and although some of the leading thinkers of that sect in the United States, as, e.g., Emerson and Channing, were graduates of the college, yet, when the former addressed the divinity students in 1838, exception was taken to some of his remarks as being too liberal. Harvard's attitude towards the slave question was decidedly conservative. Charles Sumner and Wendell Phillips, leading advocates of the Abolition movement, had, however, been educated at the college; and when the final call to arms was issued, its sons were among the first to respond. To the memory of those who fell in the Civil War, Memorial Hall, one of the finest buildings of the university, erected by the alumni at a cost of over $300,000, was fittingly dedicated in 1874. The administrations following President Quincy's resignation in 1845 were distinguished for their conservatism. The only notable additions to the university during that period were the Lawrence Scientific School and the Dental School. The struggle between the humanities and sciences, the rigid curriculum and the more liberal elective system, was about to come on in earnest, and Harvard's position in the educational world was largely decided when the great organizer and educational reformer Charles William Eliot was elected in 1869 as its president.

At the beginning of President Eliot's administration Harvard consisted of the college, wherein the courses were largely required, and a number of semi-independent professional schools, having no entrance requirements or correlation of studies. The total attendance, which was largely from New England, was, in 1869–70, 1107, including 615 college students and 13 graduates. The resident faculty numbered 78, including Lowell, Holmes, Agassiz, and Gray. The elective question was as yet in a chrysalid state, and the few elective courses offered were still in ill repute and not considered as on a par with required work. The funds of the university aggregated $2,257,989.80, and the income $270,404.63. The total value of university property was estimated at about $10,000,000. The library contained about 192,000 volumes. President Eliot's term of office lasted for 40 years and was marked by a large growth in the number of students, in the endowment, and in the university plant; the area from which students were drawn was much enlarged, and the prestige and influence of Harvard greatly increased. The courses of study open to undergraduates were extended to include all branches of knowledge and the arts, while the complete adoption of the elective system left the choice of his studies entirely to the individual student. The requirements for admission and for graduation were raised and were maintained at a high level. The Graduate Schools of Arts and Sciences, of Applied Science, and of Business Administration were established; and with the exception of the Dental School the various professional schools were all made graduate institutions, with the requirement of a college degree for admission.

President Eliot retired in 1909 and was succeeded by Abbott Lawrence Lowell. Under his administration a system was adopted whereby students are required to select their studies, which still remain entirely elective, with a definite aim, early in their college course. A new system of admission requirements was introduced, which is intended to encourage high schools to fit their pupils for Harvard. Special dormitories were erected for the freshman class.

The university in 1914 was divided into faculties and schools as follows: 1. The Faculty of Arts and Sciences, which has in its charge Harvard College, the Graduate School of Arts and Sciences, and the Graduate School of Business Administration. Harvard College, the original foundation, offers to undergraduates instruction leading to the degrees of A.B. and S.B. In the academic year 1913–14 it had 2359 students. The Graduate School of Arts and Sciences, established in 1872, offers to graduates of colleges and scientific schools opportunities for advanced work leading to the degrees of A.M. and Ph.D. It had 497 students in 1913–14. The Graduate School of Business Administration, established in 1908, provides courses in accounting, commercial law, economic resources, commercial and industrial organization, banking and finance, transportation, and insurance, and is intended to fit college graduates for administrative positions in the business world. The course of study ordinarily lasts two years, and the degree of Master in Business Administration (M.B.A.) is awarded for its completion. In 1913–14 this school had 113 students. 2. The Faculty of Divinity was formally established in 1819. It has charge of the Divinity School, which was originally Unitarian, but is now an undenominational school of theology. In 1913–14 it had 57 students. In 1908 the Andover Theological Seminary (Congregational) removed to Cambridge and affiliated with Harvard University; the courses of the Faculty of Divinity and of the Andover faculty are so planned as to form one systematic body of instruction. 3. The Faculty of Law, administering the Law School, dates from 1817. The regular course in the school is of three years' duration, and the degree of LL.B. is conferred upon its completion: the degree of Doctor of Law (J.D.) is conferred for one year's work after receiving the bachelor's degree. The Law School is one of the most flourishing departments of the university and in 1913–14 had 695 students. 4. The Faculty of Medicine has in charge the Medical School, founded in 1782, and the Dental School, founded in 1867. The course at the Medical School covers four years and leads to the degree of M.D. The degree of Doctor of Public Health (S.P.D.) is also given to holders of the M.D. degree for one year's work upon an approved subject. The Medical School is located in Boston and occupies a group of five buildings recently constructed; clinical work is carried on at a number of Boston hospitals. In 1913–14 it had an enrollment of 310. The Dental School, also in Boston, had an enrollment of 196. The regular course covers three years and leads to the degree of Doctor of Dental Medicine (D.M.D.). This school also occupies a new building, which adjoins those of the Medical School. 5. The Faculty of Applied Science has in charge the Graduate Schools of Applied Science, which at present consist of schools of engineering (civil, mechanical, and electrical), mining and metallurgy, architecture and landscape architecture, forestry, and applied biology. These schools as graduate institutions date only from 1906 and are the successors of the Lawrence Scientific School, which was established in 1847 and furnished technical instruction to undergraduates. An agreement has recently been made by Harvard and the Massachusetts Institute of Technology (q.v.) which provides for entire coöperation in the teaching of mechanical, electrical, civil, and sanitary engineering, mining and metallurgy, in the buildings of the Institute now under construction on the Charles River Embankment in Cambridge. In 1913–14 the various schools of science had in all 139 students.

In addition to these schools and faculties there is also the work of University Extension. Under this head fall (1) the Summer School of Arts and Sciences, which has been held in Cambridge for six weeks of the summer vacation annually since 1871 and in 1914 had an attendance of 898; (2) University Extension Courses in Boston given by teachers at Harvard and at other colleges in Boston or vicinity; and (3) the School for Social Workers, also in Boston, established in 1904 by coöperation of Harvard and Simmons College. All of these schools and courses are open to both men and women. In 1910 the degree of Associate in Arts (A.A.) was established to provide for students in the Summer School and the Extension Courses. It calls for the same number of courses as the A.B. degree, but does not require entrance examination nor residence at the university. There is also the School for Health Officers, conducted by Harvard University and the Massachusetts Institute of Technology, acting in coöperation, through an administrative board appointed by both institutions. The Graduate School of Medicine, founded in 1911, is designed to offer adequate opportunity to those graduates who feel the need of reviewing their studies and to those who wish to keep abreast of recent advances in medicine; it also provides courses for those interested in special subjects. In the year 1913–14 it had 272 students.

The university maintains also a number of scientific establishments, of which the most important are the following: 1. The Bussey Institution, at Jamaica Plain, about 5 miles from Boston. This was established in 1871 as an undergraduate school of agriculture, but since 1908 it has been devoted to advanced instruction and research in subjects relating to agriculture and horticulture. 2. The Arnold Arboretum, founded in 1872 under the will of James Arnold, for scientific research in arboriculture, forestry, and dendrology. It occupies about 220 acres in West Roxbury. 3. The Astronomical Observatory, established in Cambridge in 1843, maintains also a station near Arequipa, Peru, and a series of meteorological stations crossing the Andes at elevations varying from 100 to 19,200 feet. (See HARVARD COLLEGE OBSERVATORY.) 4. The University Museum, consisting (*a*) of the Museum of Comparative Zoölogy, founded in 1859 by private subscription and by the State, and greatly enriched by the collections of Prof. Louis Agassiz and the gifts of his son, Alexander Agassiz; (*b*) the Peabody Museum of American Archæology and Ethnology; (*c*) the Botanical Museum; and (*d*) the Mineralogical and Geological museums. 5. The Botanic Garden, founded in 1807, occupying about seven acres, on which are cultivated more than 5000 species for scientific purposes. 6. The Gray Herbarium, including the famous collection of Prof. Asa Gray, presented to the university in 1864. 7. The Harvard Forest, consisting of 2000 acres in Petersham, Mass. This was acquired in 1907 and is used in connection with the School of Forestry. 8. The Blue Hill Meteorological Observatory in Canton, Mass., founded and for many years maintained by Abbott Lawrence Rotch (q.v.) and bequeathed by him to the university in 1912. There are also the Semitic Museum, the Fogg Art Museum, and the Germanic Museum, each located in a special building; a new building for the Germanic Museum, to be called Adolphus Busch Hall in honor of its donor, was in 1914 in process of construction. The university library contained on July 1, 1914, 1,120,000 volumes, about 665,000 pamphlets, and about 28,250 maps; in size and the value of its collections it ranks among the foremost American libraries. It includes the College Library, containing 700,000 volumes and 450,000 pamphlets, which is to be housed in the Harry Elkins Widener Memorial Library (now building), and the libraries of the various departments, of which the library of the Law School, containing, in 1914, 156,200 volumes and 20,000 pamphlets, of the Museum of Comparative Zoölogy (51,400 volumes), and the combined Andover-Harvard Theological Library (105,000 volumes and 38,000 pamphlets) are the most important.

The government of Harvard University is vested in (1) the corporation, composed of the president, treasurer, and five fellows, a self-perpetuating body, having charge of the material and educational interests of the university; (2) the board of overseers, consisting of the president and the treasurer ex officio, and 30 elected members, five of whom are chosen each year; (3) the university council, composed of the president, professors, and assistant professors and certain other university officials, with jurisdiction on educational questions that concern more than one faculty; and (4) the faculties of the several schools.

Entrance to Harvard College is by examination only, and the prospective student may make his choice between two systems of examinations. Under the "Old Plan" he is required to pass examinations in a number of prescribed and elective studies; he may take either the examinations set by the university or those in the same subjects prepared by the College Entrance Examination Board. Under the "New Plan," adopted in 1911, he must present a certificate for the quantity of his school work and must give proof of the quality of his scholarship by passing examinations in four subjects; the object of these examinations being to discover whether he is fit for college work, not to measure his proficiency in particular studies. Entrance to the Dental School is also by examination. The other professional schools admit only graduates of approved colleges and technical schools and do not require examinations. The tuition fee in the college has for many years been $150 per year, but there is at present talk of increasing it. The tuition fees of the various graduate and special schools vary, the highest being $225 per year. There is no exemption from tuition charges, but scholarships and other forms of aid are available to the annual amount of over $75,000 for students in Harvard College and over $100,000 for students in the professional and other graduate schools.

The departments issue a number of important publications, partly independent journals and partly stated reports in scientific periodicals. Important work is done by students in clubs connected with the various departments. Athletic sports are regulated by a committee representing the faculty, the graduates, and undergraduates. Physical training is provided by the Hemenway Gymnasium, built in 1878, and by two athletic fields, containing over 40 acres. The Harvard Union, a students' clubhouse, the gift of Henry Lee Higginson, was opened in 1901. In 1886 attendance at chapel was made voluntary, and, contrary to expectations, the religious side of the university has not suffered thereby. Five eminent preachers are annually appointed, without regard to sect, to conduct in turn daily services at the chapel, and seats also are provided for students at the local churches. Religious societies find ample accommodations for their meetings at the Phillips Brooks House. The grand total attendance of the university in 1913–14 was 5407, and the faculty numbered over 800. The university property in 1913 consisted of grounds and buildings valued at over $12,000,000, scientific apparatus, etc., valued at $2,000,000, and productive funds of $27,440,000. The income, exclusive of gifts and bequests to the amount of $2,095,000, was $2,268,000.

Among the publications of the university, issued officially or indirectly, are: *Official Register of Harvard University; Harvard University Gazette; Harvard Oriental Series; Harvard Studies in Classical Philology; Quinquennial Catalogue of Harvard University; Harvard University Directory; Harvard Studies in Comparative Literature; Studies and Notes in Philology and Literature; Harvard Historical Studies; Harvard Economic Studies; Quarterly Journal of Economics; Harvard Law Review; Publications of the Astronomical Observatory; Contributions and Memoirs from the Cryptogamic Laboratory; Publications of the Museum of Comparative Zoölogy; Contributions from the Zoölogical Laboratory; Publications of the Peabody Museum of American Archæology and Ethnology; Architectural Quarterly of Harvard University; Publications of the Arnold Arboretum; Publications of the Gray Herbarium; Contributions from the Chemical Laboratory; Bibliographical Contributions of the Harvard College Library; Journal of Medical Research; Contributions from the Jefferson Physical Laboratory; Harvard Psychological Studies; Publications of the Department of Social Ethics; Harvard Theological Review; The Harvard Graduates' Magazine; The Harvard Alumni Bulletin; List of Portraits in Harvard University.* Most of the above are issued by the Harvard University Press, which was formally established in 1913 for the publication of books of a scholarly character. There are, besides, a daily paper, a humorous periodical, and several literary publications conducted by the students.

The presidents of Harvard since its inception have been: Henry Dunster, 1640–54; Charles Chauncy, 1654–72; Leonard Hoar, 1672–84; Increase Mather, 1685–1701; Samuel Willard, 1701–07; John Leverett, 1708–24; Benjamin Wadsworth, 1725–37; Edward Holyoke, 1737–69; Samuel Locke, 1770–73; Samuel Langdon, 1774–80; Joseph Willard, 1781–1804; Samuel Webber, 1806–10; John Thornton Kirkland, 1810–28; Josiah Quincy, 1829–45; Edward Everett, 1846–49; Jared Sparks, 1849–53; James Walker, 1853–60; Cornelius Conway Felton, 1860–62; Thomas Hill, 1862–68; Charles William Eliot, 1869–1909; Abbott Lawrence Lowell, 1909– .

Consult: Pierce, *History of Harvard University, 1636–1766* (Cambridge, 1833); Quincy, *The History of Harvard University* (2 vols., ib., 1840); Thayer, "Historical Sketch of Harvard University," in Drake's *History of Middlesex County* (Boston, 1880); H. C. Hill, *Harvard College by an Oxonian* (new ed., New York, 1906); H. Pier, *The Story of Harvard* (Boston, 1913); J. H. Gardiner, *Harvard* (1914); *Annual Report of the President and Treasurer of Harvard College;* and *The Harvard University Catalogue.* See RADCLIFFE COLLEGE.

HAR'VEST AND HAR'VESTING (AS. *hærfest*, OHG. *herbist*, Ger. *Herbst;* probably connected with Lat. *carpere*, to pluck, Gk. καρπός, *karpos*, fruit). The season and the process of gathering ripened crops. Formerly the terms were applied to the time of reaping and garnering cereals, but with the growth and extension of other branches of agriculture, especially in the fruit industry in America, they are more loosely applied, as "hay harvest," "cherry harvest," "potato harvest," etc. As in other agricultural lines, the development of the methods of harvesting has been marked, and during no period so strikingly as during the last half century. In former times the single-handed sickle and two-handed scythe, which appeared somewhat later, seem to have been the sole implements for cutting the stalks of grain. The cradle, a much more recent invention, consists of a scythe to the handle of which is fastened a set of three or more fingers of light but strong wood as long as the blade and parallel with it. A feature of primitive methods of harvesting was the gleaner, who went over the field to pick up the heads of grain overlooked by the reapers. Primitive methods of separating the grain from the straw and the chaff were not less crude than those of cutting.

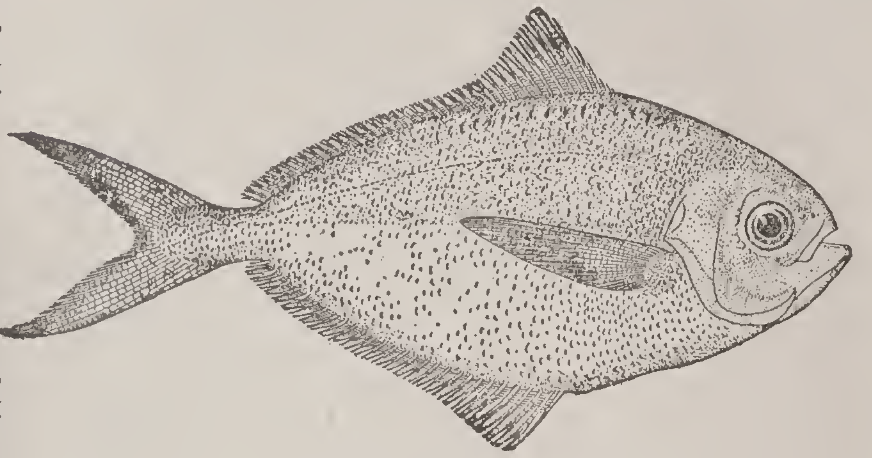
The slow, laborious, uncleanly methods of the ancients have mostly disappeared among civilized peoples, but there are countries where the traveler may find them still in vogue, though perhaps somewhat modified. Even in sections of enlightened lands many of the modern implements and methods are unknown. But such cases are exceptional. The cradle has given place to the mower, which was at first used only in cutting grass for hay, but which genius soon developed into the reaper, adapted to cut grain and lay it in piles of convenient size for binding into sheaves. The same inventive spirit produced the self-binder, a still more highly modified mower, which not only does all the work of the reaper, but ties the sheaves with twine or wire. Yet more recently has appeared the heading machine, which, drawn by a score or more of horses or propelled across the field, severs only the heads of the plants, and delivers them into wagons driven beside the machines, and the combined harvester and thresher, which not only gathers the heads, but threshes and winnows the grain and places it in sacks ready for market. On many of the wheat farms of the western United States, more especially of the arid districts, this machine has supplanted not only the reaper, but the threshing machine, since it performs the office of each. Yet the threshing machine is still popular where grain must be allowed to stand in the shock to dry for a few days after cutting. A revolution has also taken place in haymaking. Hand labor has been reduced to a minimum. The mower has supplanted the scythe in cutting; the hay tedder, which tosses the grass as it lies in the field, has replaced the hayfork in curing; the hay loader, drawn behind the wagon to be loaded, has largely taken the place of loading by hand forks, and the horse-power hayfork, which will dispose of a large load of hay in three or four forkfuls, has become a common implement on farms where stock raising or dairying is a leading feature.

In recent years much progress has been made in devising efficient machines for harvesting, binding, and shocking corn, also for picking corn from the stalks, husking the ears, and shredding the fodder. In fact, the methods of harvesting, so far as has been possible, have been improved to a remarkable extent, nearly every important crop having its special harvesting machinery. Cotton is the most notable exception; machines adapted to its irregular method of ripening seem impossible.

The introduction of improved harvesting machinery has done much to reduce the labor cost of production and increase the productive efficiency of the farmer. It has been maintained, e.g., that by the use of improved cultivating and harvesting machinery the labor required to produce a bushel of wheat has been reduced from three hours to 10 minutes. See REAPERS; REAPING.

No less remarkable have been the developments in methods of fruit harvesting. It is highly probable that in all countries methods were at first crude and wasteful. In America, during the first half of the nineteenth century, apples rarely arrived in market except in bulk by the wagon load, and peaches at first were treated no better. During the last half, reform has taken place; the former rarely arrive, except in local markets, in any other package than the barrel or box, and the latter, it is probable, never in bulk as formerly, but almost always in baskets or crates. In olden times when there was little or no market for fruits, except in the towns and their immediate neighborhood, the tree fruits were shaken or beaten to the ground —a method still popular with those apples the chief end of which is cider. But with the development of a fresh-fruit market, increased care was taken to avoid bruising. With increasing prosperity the demand for fine specimens increased, and the grower was compelled not only to produce a superior article, but he was forced to present it for sale in an attractive package. All details of modern fruit harvest depend upon the peculiar demands of the market, the distance the product must be shipped, the means of transportation, and the shipping qualities of the kind or the variety of fruit. These four factors determine the time of picking, which with perishable fruits, especially when sent to distant markets, is several days before maturity—a stage learned only by experience with the individual kind or even variety. In general, for shipping to distant markets, strawberries are gathered when they have colored well; red raspberries when they become soft; peaches when an experienced picker detects, with the ball of his thumb, a very slight softness of the tissue; plums while still too green to be pleasantly edible; pears when, upon lifting the fruit, the twig and the stem separate without either one breaking; apples when they readily part from the stem by a twist of the fruit. For local markets the fruit may be allowed to become riper. Again, these factors determine the style and size of the package and many other details which, since they properly belong to the sale of fruit rather than to harvesting, will be found discussed under the title MARKET AND MARKETING. See also HORTICULTURE; FRUIT, CULTIVATED; and articles upon individual fruits. Consult: Davidson, *Farm Machinery and Farm Motors* (New York, 1908); Hartley, "Harvesting and Storing Corn," in *United States Department of Agriculture, Farmers' Bulletin 313* (Washington, 1907); H. N. Casson, *The Romance of the Reaper* (New York, 1908); F. L. Greeno, *Obed Hussey: A True Record of his Greatest Invention, the Reaper* (Rochester, 1912).

HARVEST FISH (so called from the time of its annual appearance). An edible fish of the rudder-fish family (Stromateidæ), also called butterfish, or dollar fish, and lafayette. The common northern species (*Rhombus triacanthus*) is about 7 inches in length, is related to and resembles in its compressed oval shape the pompano, and when first taken from the water displays brilliant, shifting, iridescent colors. They are an excellent pan fish, tasting like mackerel, and are extensively caught off New Jersey and New England in midsummer (at harvest time). A southern species (*Rhombus paru*) ranges from Chesapeake Bay to Brazil, is greenish above and golden below, and is a favorite in the Virginia coast markets. Other species in the West Indies and California are highly prized.



SOUTHERN HARVEST FISH
(*Rhombus paru*).

HARVEST FLY. The popular name in the United States for several species of cicada, because they make their appearance in harvest. See CICADA.

HAR′VESTMAN, DADDY LONGLEGS, or GRANDFATHER GREYBEARD. An arachnidan of the order Opiliones, or Phalangidea. These creatures are of world-wide distribution and are very common in most parts of the United States and in South America. One blind form inhabits Mammoth Cave, Kentucky. The majority of the family may be recognized by their short bodies and long, stiltlike legs, bowed or elevated in the middle, so that the body of the insect is almost on the ground. They have a very characteristic and disagreeable smell. The eyes are two in number, and the mandibles are pincerlike. There is only one pair of spiracles on the lower side of the body at the junction of the cephalothorax and abdomen. The crane flies of the dipterous family Tipulidæ are called daddy longlegs in Europe, and should not be confused with these arachnida. The harvestmen are said to feed on small insects, especially aphids; but C. M. Weed states that they are much more apt to feed on insects found dead than to kill living ones. They are abundant in woods and fields from middle summer until late autumn and are likely to collect in sheds, outhouses, barns, and even houses, or on bare rocks or tree trunks. Very few species survive the winter as adults. Most of them lay their eggs in the ground in the autumn.

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HARVEST MITE. See MITE.

HARVEST MOON. The full moon occurring nearest the date of the autumnal equinox (q.v.), September 22. The moon does not rise at the same time every night on account of her changing position in the sky caused by her orbital motion around the earth. Each night the rising is later; and the *retardation*, as it is called, averages about 50 minutes. In the latitude of New York the maximum retardation is 1 hour 17 minutes, and the minimum, 23 minutes. In higher latitudes the range of the retardation may be even greater, and the minimum retardation may descend to *nil*. The minimum retardation occurs when the moon is passing the first point of Aries, or once in each lunar month. If the retardation is a minimum at the time of full moon, there will be strong moonlight almost all night on several successive nights; for, the retardation being small, the moon will rise each night at nearly the same time as she does on the night of full moon. Now this state of affairs is realized when the sun is passing the first point of Libra, that is, at the autumnal equinox, and as in northern latitudes this falls during the time of harvest, the continuance of light after sunset is very useful to the farmers when gathering in their crops. Consequently this full moon is called the harvest moon. Similar conditions, but less marked, obtain at the next full moon, which, since it occurs during the hunting season, is called the hunter's moon.

HAR'VEY. A city in Cook Co., Ill., 20 miles south of the Chicago courthouse, on the Illinois Central, the Grand Trunk, the Chicago, Terre Haute, and Southeastern, and the Baltimore and Ohio Chicago Terminal railroads, and on the Calumet River (Map: Illinois, J 2). It is a residential suburb of Chicago and also an industrial centre. The city contains a Carnegie library. The principal manufactures include mining, oil-well, road, and ditching machinery, gas stoves, automobiles, aluminium ware, cement, whiting, telegraph and telephone supplies, railway cars, foundry equipment, electric travelers, and railroad supplies. Harvey was founded in 1891, incorporated as a village in 1892, as a city in 1895, and adopted the commission form of government in 1912. Pop., 1900, 5395; 1910, 7227.

HARVEY, ARTHUR (1834–1900). A Canadian journalist and statistician. He was born at Hallsworth, Suffolk, England, and was educated in France, Holland, and at Trinity College, Dublin. He came to Canada in 1856, began newspaper work, and in 1859–61, when the Canadian Parliament was at Quebec, he was correspondent for the Hamilton *Spectator* and the Montreal *Gazette.* Afterward he was for a short time editor of the Quebec *Morning Chronicle*, then the chief Conservative journal in that province. In 1862–70 he was chief statistical clerk in the Auditor General's Department. *The Year Book and Almanac of British North America*, which he had founded in 1867, he edited until 1870, when he removed to Toronto and became manager of the Provincial Insurance Company and afterward of the Toronto Loan and Land Company. Harvey's mathematical and statistical knowledge was highly useful in framing sound insurance legislation for the Dominion of Canada. He was the author of numerous papers and articles on scientific and economic subjects. He was elected a fellow of the Royal Statistical Society, vice president of the Astronomical and Physical Society, and in 1890–93 was president of the Canadian Institute.

HARVEY, ELI (1860–). An American painter, sculptor, and critic, born at Ogden, Ohio. He studied under Lentz, Noble, and Rebisso at the Cincinnati Academy and under Lefebvre, Constant, Doucet, and other masters in Paris. Further studies in sculpture were made under Frémiet at the Jardin des Plantes. It was the influence of this latter training which counted most strongly in Harvey's success. Chiefly devoted to the sculpture of animals of the cat tribe, he is represented by the "Lioness" and "Maternal Caress," statuettes in the Metropolitan Museum, New York; by the sculptures in the Lion House of the New York Zoölogical Garden; and by other works in the museums of St. Louis, London, and Liverpool. He received a gold medal for painting at the Paris-Province Exposition (1900).

HARVEY, GABRIEL (c.1545–1630). An English author. He was born at Saffron Walden and educated at Cambridge, where he took his B.A. degree in 1570, and was elected fellow of Pembroke Hall a few months later and master of Trinity Hall in 1585. He passed most of his life at the university. He was involved with Robert Greene and Thomas Nash in one of the most notorious personal controversies of the time, to which his own contributions are specimens of the most abusive style of Elizabethan prose, witness his *Trimming of Thomas Nashe* (1597). He is best known as the friend of Sidney and of Spenser, who has celebrated him under the name of Hobbinol in the *Shepheard's Calendar*, and as a leading member of the school which vigorously endeavored to enforce upon Englishmen the strict rules of classical metre and dramatic construction. He asserted that he was the first English poet to naturalize the dactylic hexameter, and he induced Spenser to abandon for a time the use of rhyme. Consult his *Works*, edited by A. B. Grosart, privately printed in eight volumes (London, 1884–85), and *Letter Book*, edited by Scott (ib., 1884).

HARVEY, SIR GEORGE (1806–76). A Scottish historical, genre, and landscape painter. He was born at St. Ninians, near Stirling, and studied in the school of the Trustees' Academy, Edinburgh, under Sir William Allan. In 1826, when the Royal Scottish Academy was instituted, he was elected an associate, though only

20 years old, and in 1829 an academician. Harvey was the most truly national of Scottish genre painters and has depicted more aspects of Scottish life than any other painter. His training was deficient, and, owing to the use of bituminous colors, many of his pictures are practically ruins. They are widely known through engravings. The most important include: "Covenanters Preaching" (Glasgow Museum); "Communion of the Covenanters" (National Gallery, Edinburgh); "Quitting the Manse," "Sabbath in the Glen," a series of school pictures (National Gallery, Edinburgh); besides others in a joyous vein, such as "The Curlers" and "The Village Bowlers" (National Gallery, Edinburgh). At 60 he began landscape painting, particularly of the Highland country, of which he depicts the peaceful and intimate phases. The best known of his landscapes are "The Enterkin"; "A Drove Road" (Glasgow Museum); "Glen Dhu, Arran"; "Scenery in the Highlands." He published *Notes on the Early History of the Scottish Academy* (1873) and *Recollections* (1888). Consult McKay, *The Scottish School of Painting* (London, 1906).

HARVEY, George (Brinton McClellan) (1864–). An American editor and publisher. He was born at Peacham, Vt., and was educated at Peacham Academy. Between 1882 and 1886 he was reporter for the Springfield *Republican*, the Chicago *News*, and the New York *World*. He served as insurance commissioner of New Jersey in 1890–91, held the managing editorship of the New York *World* in 1891–93, and was constructor and president of various electric railroads in 1894–98. In 1899 he purchased the *North American Review*, which he edited thereafter, also editing *Harper's Weekly* from 1902 to 1913; in 1903 he bought the *Metropolitan Magazine*. He became president of Harper and Brothers in 1900 and a director in several corporations. He published *Women* (1908) and *The Power of Tolerance, and Other Speeches* (1911).

HARVEY, Sir John. A Colonial Governor of Virginia. He first visited the province as one of the commissioners sent out by James I in 1623 to get evidence which would justify him in suppressing the Virginia Company. Appointed Governor after Yeardley's death, he began his administration in 1630 and soon made himself thoroughly detested by the colonists, for he not only favored the interests of individuals, such as Lord Baltimore, at the expense of Virginia, but filled his own pockets by imposing unusual fines on the settlers, all fines being by royal warrant a perquisite of the Governor's. In 1635 an assembly was called to hear complaints against him, and on April 28 the council met and decreed "Sir John Harvey thrust out of his government, and Capt. John West acts as Governor till the King's pleasure known." Harvey was put aboard a ship and sent to England in charge of two members of the House of Burgesses. Charles I reinstated him and refused even to listen to the delegates who had been sent over to present the case of the colonists. Two years after his return to Virginia, however, the King relieved him and appointed a new Governor in his place.

HARVEY, Sir John (1778–1852). A British soldier. He entered the army at a very early age and saw service in many parts of the world. In 1812 he was appointed deputy adjutant general of the army in Canada and was received with great favor by Sir George Prevost, who asked his advice on the defense of the wide frontiers of Canada against the United States forces. He was present at the unsuccessful defense of Fort George (May 27, 1813), but escaped with General Vincent and most of the British troops. On June 6 he led an attack on General Dearborn's forces at Stony Creek and later in the year was adjutant general of the British army at the battle of Chrystler's Farm. Upon the close of the War of 1812 he returned to England and at the battle of Waterloo was on the staff of the Duke of Wellington. In 1836 he was once more in America, this time as Governor of Prince Edward Island. From 1837 to 1841 he was Lieutenant Governor of New Brunswick, and in 1846 was appointed Governor and commander in chief of Newfoundland, but remained there only a short time before he was made Lieutenant Governor of Nova Scotia, which office he held until his death. Consult Kingsford, *The History of Canada*, vol. viii (Toronto, 1895).

HARVEY, John Martin (1867–). An English actor manager, born at Wyvenhoe, Essex. He was educated at King's College, London, and studied elocution under John Ryder. His first appearance on the stage was in 1881 at the Old Court Theatre under John Clayton. In 1882 he joined Sir Henry Irving, with whom he played for many years, and whom he accompanied on various tours to the United States. Later he was successively manager of the Lyceum, Prince of Wales, Court, Apollo, and Royalty theatres, producing *The Only Way* (1899); *Hamlet* (1904); *The Corsican Brothers* (1907); *The Last Heir* (1908); *The World and his Wife* (1909); *Richard III* (1910); *The Lowland Wolf* (1911); *Œdipus Rex* (1912); *The Taming of the Shrew* (1913); *The Faun* (1913). In 1914 he planned a tour of Canada, but owing to the war in Europe his plans were changed; instead he toured England, taking occasion at the end of his evening's play to deliver patriotic addresses to the audience, calling on young men to join the new army of Lord Kitchener.

HARVEY, Moses (1820–1901). A Canadian author, born near Armagh, Ireland, and educated at Belfast College in arts and theology. In 1852, he left his charge in Maryport, Cumberland, England, and became pastor of the Free Presbyterian Church of St. John's, Newfoundland, from which he retired in 1878. Harvey made special studies of the geography and history of Newfoundland, contributed to the *Encyclopædia Britannica* (9th ed.) articles on "Seal Fisheries," "Newfoundland," and "Labrador," and published: *Poetry and Literature of the Bible* (1852); *Lectures, Literary and Biographical* (1864); *Comack's Journey across Newfoundland* (1873); *Across Newfoundland with the Governor* (1879); *Newfoundland, the Oldest British Colony* (1883); *Where Are We and Whither Tending?* (1886); *Text-Book of Newfoundland History* (2d ed., 1890); *Artificial Propagation of Marine Food Fishes* (1892); *Newfoundland As It Is* (1894); *Newfoundland in the Jubilee Year* (1897); *Newfoundland in 1900* (1900); *Newfoundland at the Beginning of the Twentieth Century* (1902).

HARVEY, Sir Robert (1847–). An English mining engineer and financier. He was born and educated at Truro, became a mining engineer in Bolivia, made important contributions to the manufacture of iodine, went to Peru as engineer for nitrate works, and was inspector general of the Tarapacá nitrate fields until 1881. Then he formed the firm of North and Harvey, manufacturers of iodine and nitrate, and became one of the great South American capitalists, with interests in the Arauco Company, the Antofogasta (Chile) and Bolivia Railway, the Anglo-South American Bank, etc. He was high sheriff of Devon in 1896–97, and then of Cornwall, and was knighted in 1901.

HARVEY, William (1578–1657). An English anatomist, celebrated as the discoverer of the circulation of the blood. He was born at Folkestone, in Kent, of a London family of great respectability. When he was 14 years old, he was sent to Caius College, Cambridge, where he was admitted as a pensioner in 1593. After five years' study at the university he traveled through France and Germany and decided to study medicine at Padua. Here he came under the influence of some of the best teachers of the time, notably Fabricius (q.v.). From this master the young student learned of the existence of the valves in the veins. Having obtained his medical degree in 1602, he returned to England and began to practice his profession in London. He was admitted a candidate of the London College in 1604 and was elected a fellow in 1607. Two years later he was appointed physician to St. Bartholomew's Hospital and in 1615 was made professor of anatomy and surgery. His discovery of the circulation of the blood he perfected in 1616. He was appointed physician extraordinary to James I in 1618 and was physician to Charles I from 1632 to 1646. He accompanied the King in the battle of Edgehill in 1642, and during this engagement the Prince and the Duke of York were intrusted to his care. In 1645 he was, by the royal mandate, elected warden of Merton College, succeeding Dr. Nathaniel Brent. During his residence at Oxford he made many experiments, and pursued researches connected with the subject of generation. In 1646, upon the surrender of Oxford to Parliament, he went to practice his profession in London. In 1651 the results of his investigations on the development of the chick, in which he was assisted by Rev. George Bathurst of Trinity College, were given to the world. In 1653 Harvey built a library and museum, which he presented to the members of the College of Physicians. He resigned his professorship of anatomy and surgery in 1653, at the age of 75, and he died on June 3, 1657, of paralysis, which succeeded several years of suffering from gout.

Harvey's description of the course and circulation of the blood met with great opposition, and the ridicule and unwarranted attacks resulted in a great diminution of his practice. In time, however, he had the satisfaction of seeing his doctrine accepted entire; but the labor and devotion of 25 years were requisite for the attainment of the final result. Six diagrams giving views of the circulatory system of the human body, life-size, with which Harvey illustrated his lectures, are still preserved in the museum of the Royal College of Physicians. Previous to Harvey's time it was believed that the blood was constantly in motion, but the arteries were believed to contain air only, because they were found to be empty after death. Others were close to the discovery of the course of the blood, but it was reserved for Harvey to comprehend and elucidate the whole matter. Although he communicated his discovery to his pupils as early as 1619, it was not till 1628 that his work *Exercitatio de Motu Cordis et Sanguinis in Animalibus* was published at Frankfort, as a small quarto of 72 pages, called by Haller *Opusculum Aureum.* The best edition of it was published at Leyden (1739). Among other works are his *Exercitationes de Generatione Animalium, quibus Accedunt Quædam de Partu, de Membranis ac Tumoribus Uteri, et de Conceptione* (c.1651; also Leyden, 1737); and *Exercitationes Duæ Anatomicæ de Circulatione Sanguinis* (Oxford [?], c.1645). A complete edition of Harvey's works in Latin was published in 1766 by the College of Physicians of London, including his *Treatise on the Circulation,* with the prefaces of the first edition of 1628; his *Exercitations* addressed to Riolan; his work on the *Generation of Animals;* the *Account of the Dissection of Thomas Parr;* and *Nine Epistles of Harvey* addressed to various persons; together with a copy of the diploma of doctor of medicine conferred upon Harvey by the University of Padua. Prefixed to this collection of his works is a *Life of Harvey* by Lawrence. Consult Willis, *Life of Harvey* (London, 1881). See Physiology.

HARVEY, William Henry (1811–66). An Irish botanist, born at Summerville, near Limerick. He received the bent towards his specialty from the schoolmaster with whom he studied in Kildare. As a field naturalist, he began his researches in his native land, but they extended to South Africa (1835–42), and for the last 10 years of his life he was professor of botany in Dublin University. Travels in America, India, Australia, and the South Seas had augmented his botanical knowledge, and he was an authority especially in algæ, though he disputed the Darwinian hypothesis. He published a *Manual of British Algæ* (1841); *Phycologia Britannica, a History of British Seaweeds* (1846–51); *Nereis Boreali-Americana* (1852–58); *Phycologia Australica* (1858–63); and other works.

HAR'VEYIZED STEEL, Harvey Process. See Armor Plate; Casehardening.

HARWICH, hăr'ĭj. An ancient seaport, market town, and municipal borough in Essex, England, at the mouth of the Stour, on the North Sea, 70 miles northeast of London (Map: England, H 5). Its important industries are fisheries, shipbuilding, and cement and manure manufacturing. Its coasting and foreign trade with Germany, Denmark, and Holland is considerable. It exports cement, fish, manure, ironware, machinery, leather, etc., and imports grain, silk, woolen and cotton goods, timber, and tobacco. The harbor is commodious, safe, and strongly fortified. Harwich is one of the chief ports in England for passenger traffic with the Continent. Parkestone Quay, 2 miles from the town, is the terminus of the Great Eastern Railway steamers, which ply twice daily between the town and Antwerp and also the Hook of Holland. There are other lines in communication with Hamburg, Amsterdam, Rotterdam, Esbjerg, and Copenhagen. In 1912 the total net tonnage of vessels entered and cleared in foreign and colonial commerce was 1,936,111 tons, and the combined value of the imports and exports was $168,906,000. The town is pleasantly situated on an elevated promontory and is a small sea-bathing resort. It has tramways and is supplied with water, gas, and electric lighting. Harwich was a Roman station and a great Danish military depot. In 885 it was the scene of a great naval conflict between the Danes and King Alfred's fleet and in 1666 of another between the Dutch and English. It was made a parliamentary and municipal borough by Edward II in 1318. Pop., 1901, 10,019; 1911, 13,623.

HAR'WOOD, ANDREW ALLEN (1802–84). An American naval officer, born at Settle, Pa. In 1818 he was appointed a midshipman in the navy. In 1819–23 he served in the sloop of war *Hornet*, which was engaged in suppressing the slave trade on the west coast of Africa and piracy in the West Indies. In 1844 he was made a member of a commission to visit dockyards in England and France and report on ordnance improvements. He became a lieutenant in 1827, commander in 1848, captain in 1855, and commodore in 1862. During the Civil War he served as chief of the Bureau of Ordnance, in command of the Potomac flotilla, commandant of the Washington Navy Yard, and secretary of the Lighthouse Board. He retired in 1864, but was promoted to rear admiral on the retired list in 1869 and continued on duty until 1872. He published *Law and Practice of United States Navy Courts-Martial* (1867) and edited *Summary Courts-Martial.*

HARZER, här'tsẽr, PAUL HERMANN (1857–). A German astronomer, born at Grossenhain (Saxony). After study in Leipzig, Berlin, and Rome, he was assistant at the Leipzig Observatory from 1878 to 1881, was appointed observer there in 1882, and in the same year became a lecturer in the university. From 1887 to 1897 he was director of the Archducal Observatory at Gotha and in the latter year was appointed director of the Kiel Observatory, where he was also rector of the university in 1908–09. In theoretical astronomy he made numerous investigations of importance, results of which appeared at various times in scientific journals, particularly in the *Astronomische Nachrichten*, his contributions to which include: "Eine neue Methode die negativen und ungeraden Potenzen der Entfernungen der Himmelskörper zu entwickeln" (vol. cii, 1882) and "Untersuchung über die astronomische Strahlenbrechung auf Grund der Differentialgleichungen der elastischen Lichtbewegungen in der Atmosphäre" (vols. civ, cvii, 1882, 1883). He also wrote *Die exakten Wissenschaften im Alten Japan* (1905); *Ueber die geometrische Methode zur Bestimmung der Bahnen von Himmelskörpern nach fünf Beobachtungen* (1910).

HARZ (härts) **MOUNTAINS.** An isolated mountain range in north Germany, extending between the rivers Saale and Leine, through Prussia, Brunswick, and Anhalt (Map: Germany, D 3). Its length from Mansfeld on the southeast to Seesen on the northwest is about 60 miles and its total area about 900 square miles. The range, formed by a flatly arched uplift, rises sharply from the surrounding plain and is dissected by numerous stream valleys. The Upper Harz, comprising the northwestern section, has an elevation of from 1000 to 3000 feet, and culminates in the Brocken, 3747 feet. In the southeast, or Lower Harz region, the elevations rarely exceed 1000 feet. The mountain slopes of the Upper Harz are heavily wooded with pine, oak, and beech; but the summits, owing to the raw climate, support only a stunted growth of vegetation. The Lower Harz is to a great extent denuded of woods and given over to agriculture. The higher peaks are enveloped in fog during a large part of the year, and the rainfall is heavy. Geologically the range consists of Devonian and Carboniferous strata, which have been penetrated by eruptive granites, diabase, and porphyry, as the Brocken. The mineral resources are of great importance, copper, silver, lead, and iron being produced at several localities. Mining was carried on as early as the twelfth century, but the deposits are still far from exhausted. Clausthal, in the Upper Harz, is the seat of a famous mining academy. The region is well patronized by tourists, being penetrated by several railroads, as it is rich in historic and legendary interest as well as in scenery. Consult: H. Heine, *Die Harzreise* (Hamburg, 1853); H. J. Forman, *In the Footprints of Heine* (New York, 1910); Friedrich Günther, *Der Harz* (2d ed., Bielefeld, 1910). See BROCKEN.

HARZ EISE, härts'rī-ze, DIE (Ger., journey through the Harz). A celebrated autobiographical narrative by Heinrich Heine (1824).

HASAN. See BENI HASAN.

HASAN, hä'san, AND **HUSAIN,** hŭ-sain'. Two grandchildren of Mohammed, sons of his youngest daughter, Fatima, and Ali. After the assassination of Ali (q.v.) his adherents at Cufa recognized his eldest son, Hasan, as caliph, while Muawiya asserted his claim to the entire Moslem Empire and gathered a powerful army to invade Irak. Hasan, a man of little courage, with more taste for the harem than the camp, agreed to abdicate at the first taste of war and retired to Medina (661). He was poisoned by one of his wives eight years later. On the death of Muawiya (680) the people of Cufa made overtures to Husain, who was then at Mecca visiting him, to claim the caliphate in opposition to Yazid, Muawiya's son. With a small force he proceeded to Irak. Yazid, well informed of the movement, had made ample preparations to receive him, and he was slain at Kerbela on the 10th of Muharram, 681. The fate of the house of Ali made a deep impression on the Moslem world. The Shiites (see MOHAMMEDAN SECTS) still refuse to recognize the claims to the caliphate of any except Ali and his sons. They observe the 10th of Muharram as a day of mourning and devote the nine preceding days of the month to the memory of the martyrs. The so-called "miracle play," a dramatic representation of the history of Husain, is given, and the spectators become wrought up to the most extravagant expressions of sorrow and the highest pitch of fanatical enthusiasm. In one of its forms the play lasts for the entire 10 days, culminating on the last day in the representation of the death of Husain. Consult: Muir, *Annals of the Early Caliphate* (London, 1891); Pelly, *The Miracle Play of Hasan and Hosein, Collected from Oral Tradition* (ib., 1879); Müller, *Der Islam im Morgen- und Abendland* (Berlin, 1885); Wellhausen, *Das arabische Reich und sein Sturz* (ib., 1902).

HASAN BEN SABBAH, häs'än ben säb'bä. The founder of the sect of the Assassins (q.v.).

HAS'CALL, MILO SMITH (1829–1904). An American soldier, born in Genesee Co., N. Y. In 1846 he moved to Goshen, Ind., and two years later was appointed a cadet at the United States Military Academy, graduating in 1852. After two years' service in the regular army he resigned his commission and went back to

Goshen, where he became a lawyer and filled various political offices. At the outbreak of the Civil War he enlisted as a private, but was soon appointed aid-de-camp to General Morris, with the rank of captain, and assisted in organizing six volunteer regiments. On June 12, 1861, he was made colonel of the Seventeenth Indiana Volunteers and took part in the successful West Virginia campaign. He was commissioned brigadier general of volunteers on April 25, 1862. Having been transferred to the Army of the Cumberland, he was put in command of a brigade which fought through the Tennessee campaign (October, 1862, to March, 1863). At the battle of Murfreesboro (Dec. 31, 1862, to Jan. 3, 1863) he had command of the Sixth Division under Major General Crittenden. From June to August, 1863, he was in command of the District of Indiana, and afterward commanded a division in the Army of the Ohio, which took part in the defense of Knoxville (November to December, 1863). The next year he commanded the Second Division of the Twenty-third Army Corps in the Army of the Ohio during the invasion of Georgia. He resigned on Oct. 27, 1864, and returned to Goshen, where he engaged in banking, but later entered the real-estate business in Chicago.

HASCHKA, häsh′kȧ, Lorenz Leopold (1749–1827). An Austrian poet, born at Vienna. In 1798 he became professor of æsthetics in the Theresianum; he was custodian of the university library and wrote many lyrics, of which the best known is the Austrian national hymn, "Gott erhalte Franz den Kaiser," set to music by Haydn.

HASDEU, häs-dĕ′oo, Bogdan Petriceicu (1838–1907). A Rumanian poet, historian, and philologist, born at Khotin (Bessarabia). He taught history in the Gymnasium of Jassy and in 1878 became professor of comparative philology and director of the national archives at Bucharest. His literary labors include dramas, satiric romances, and editorial work, especially on the *Revista Noua* and the philological and historical periodical *Columna lui Traian* (1870–77). The most important of his philological works are *Etymologicum Magnum Romaniæ* (1887–98, unfinished) and *Cuvente den Bĕtrâni* (1878–79). His philological writings evince a vast amount of learning, but many of his theories lack a scientific foundation.

HAS′DRUBAL (Phœnician, whose help is Baal, Gk. ’Ασδρούβας, *Asdroubas*). A name of frequent occurrence in Carthaginian history. The more important persons who bore the name were: 1. Son of Hanno, a general during the First Punic War, who took the field against Regulus in 256 B.C. and met with signal defeat. He was afterward sent to Sicily with a large army and 140 elephants, but accomplished nothing during a two years' stay in the island and was at length totally overthrown at Panormus (Palermo) by the Roman consul Metellus in 250 B.C. and on his return to Carthage was put to death for his lack of generalship. 2. Son-in-law of the great Hamilcar Barca (q.v.), an important statesman of the period between the First and Second Punic wars and a constant ally of his father-in-law and the popular party in Carthage. After demonstrating his military ability in several minor campaigns, he received the chief control in Spain (228 B.C.), where he soon proved his still greater administrative and diplomatic power. He founded the city of Carthago Nova (Cartagena) as a port of communication with the mother city and also as a convenient centre for the business of the silver mines which contributed immensely to the Carthaginian resources; and he was so successful in winning over or subduing the Spanish tribes that he brought almost the whole peninsula under his sway. He was assassinated by a revengeful slave in 221 B.C. 3. Son of Hamilcar Barca, and brother of the great Hannibal (q.v.), who left him in command in Spain when he began his famous march across the Alps to Italy (218 B.C.). For several years he carried on operations in Spain against the Roman forces under the two brothers, Gnæus Scipio and Publius Scipio, but without decisive results, although supported by reënforcements under Himilco, Mago, and Hasdrubal, son of Gisco (see 4, below). In 212, however, he gained a great victory over the Romans, in which Publius Scipio was slain; but the Romans regained the advantage in the following year by the capture of Carthago Nova, the enemy's base of supplies. Shortly after, Hasdrubal gathered a greater force with the intention of following Hannibal's example and invading Italy. He crossed the Alps in 207 B.C. and laid siege to Placentia (Piacenza)—a fatal step, as delay gave the Romans an opportunity to attack him before he could join Hannibal. A bloody battle was fought on the banks of the Metaurus, and Hasdrubal fell in the thick of the fight. His head was thrown into Hannibal's camp as evidence of his defeat. (Consult Oehler, *Der letzte Feldzug des Barkiden Hasdrubals*, Berlin, 1897, and Lehmann, *Die Angriffe der drei Barkiden auf Italien*, Leipzig, 1905.) 4. Son of Gisco, mentioned above as one of the generals sent to Spain to assist Hasdrubal No. 3. Afterward he took charge of the military operations in and around Carthage; and when Scipio Africanus Maior came into Africa with a large army (204 B.C.), the diplomacy of Hasdrubal won the assistance of Syphax, the Numidian King, which Scipio also had endeavored to gain. (See Sophonisba.) But the allied forces were mercilessly annihilated by Scipio, who hemmed them within their burning camp; but few, including the two generals, escaped. Hasdrubal met a violent death in Carthage for his failure. 5. A general of the Third Punic War. For his failure in war against the Numidian King Masinissa, he had been banished from Carthage, but was recalled to take the command in the last struggle against Rome (149 B.C.). His arbitrary and despotic methods alienated many from him, and, notwithstanding the heroism of the defenders, the persistence of the Roman attack led to the fall of Carthage (146 B.C.), when Hasdrubal fled to Scipio's camp and was made prisoner. He was led in triumph at Rome and allowed to pass his remaining days in obscurity in Italy.

HASE, hä′ze, Karl August von (1800–90). An eminent theological writer of Germany. He was born at Steinbach in Saxony, Aug. 25, 1800, and studied theology at Leipzig and Erlangen. He became in 1823 privatdocent at Tübingen, but was for political reasons confined for 10 months in the fortress of Hohenasperg, during which time he produced a theological novel, *Die Proselyten* (1827), and a *Lehrbuch der evangelischen Dogmatik* (1826; 6th ed., 1870). Released in August, 1825, he went to Dresden and did literary work. In 1828 he became privatdocent at Leipzig and in 1829 professor of philosophy in Jena, where his lectures on dogmatics and the life of Christ proved especially attractive. He attempted to bring theology into harmony with modern thought and at the same time keep the warmth of religious life. His *Leben Jesu* (1829; 5th ed., 1865; trans., *The Life of Jesus*, 1881), which appeared six years before Strauss's, proposed as its aim to show "how Jesus of Nazareth, according to divine destination, by the free act of His own spirit, and by the opportunities of His time, became the Saviour of the world." He opposed modern supernaturalism in *Die Leipziger Disputation* (1827) and extreme rationalism in *Theologische Streitschriften* (1834–37) and *Die Tübinger Schule* (1855). His *Hutterus Redivivus* (1827; 10th ed., 1862) seeks to do justice to the old Lutheran dogmatics in contrast with modern systems, by exhibiting its harmonious completeness. Besides his *Lehrbuch der Kirchengeschichte* (1834; 12th ed., 1900), which has been translated into English (*A History of the Christian Church*, from the 7th ed., New York, 1855), Hase treated special portions of Church history in *Die beiden Erzbischöfe* (1839); *Neue Propheten* (1851); *Franz von Assisi* (1856); *Das geistliche Schauspiel* (1858; trans., *Miracle Plays and Sacred Dramas*, 1880); *Handbuch der protestantischen Polemik gegen die römischkatholische Kirche* (1862; 4th ed., 1886). He also published several works on ecclesiastical law; an edition of the *Libri Symbolici Ecclesiæ Evangelicæ* (1827); and *Ideale und Irrthümer* (1872). After his death three volumes of political and theological papers were published (1891–92).

HASE, hä′ze, Karl Benedict (1780–1864). A German classical scholar, born at Sulza, near Weimar. He studied at Jena and Helmstedt and in 1801 went to Paris, where he was put in charge of the manuscripts of the Imperial Library (1805), was appointed professor of Greek paleography and of modern Greek at the Ecole des Langues Orientales (1816), then professor of German at the Polytechnic Institute (1830), conservator of manuscripts in the library (1832), and, in 1852, professor of comparative grammar in the University of Paris. He was long an editor of the *Journal des Savants;* contributed much to Dindorf's edition of Stephanus' *Lexicon* (1831–44); edited Leo Diaconus (1819), Valerius Maximus (1823), Suetonius (1828), and the fragment, *De Ostentis et Mensibus*, by Laurentius Lydus (1823); and by his wide knowledge of late Greek greatly facilitated the publication of *Recueil des historiens des croisades* (1875). Consult Guigniaut, *Notice historique sur la vie et les travaux de Carl Benedict Hase* (Paris, 1867), and Haine, *Hases Briefe von der Wanderung und aus Paris* (Leipzig, 1894), a vivid autobiographical account of the hardships of Hase's earlier years.

HASENAUER, hä′ze-nou′ẽr, Karl, Baron von (1833–94). An Austrian architect, born in Vienna, where he studied at the academy under Van der Nüll and Siccardsburg and obtained the first prize in 1854. After extensive travels in Germany, Italy, France, England, and Scotland, he returned to Vienna, was again awarded the first prize for architecture at the art exhibition of 1864, became a member of the Academy of Fine Arts in 1866, and honorary member of the Institute of British Architects in 1868. He designed the Palais Lützow, one of the finest houses in Vienna, but his most important work was the erection of the magnificent Imperial Museums of Art and Natural History (1872–84) in purest Renaissance style, after his own and Semper's designs. He also built the new Hofburg theatre (completed 1888) and designed the addition to the Imperial palace. He was architect for the buildings of the Vienna Exposition in 1873 and was raised to a barony in the same year.

HASENCLEVER, hä′zen-klā′vẽr, Johann Peter (1810–53). A German genre painter, born at Remscheid. He studied under Schadow, at the Düsseldorf Academy, and then spent some years in Munich and Italy. After 1842 he settled in Düsseldorf. His works are usually humorous genre subjects, such as "A Family Quarrel" (1837), New Pinakothek, Munich; "Tasting Wine" and "The Reading Room" (1843), both in National Gallery, Berlin; "Topers in the Wine-Cellar" (1847), Ravené Gallery, Berlin. He also executed a series of scenes from Kortum's *Jobsiade*, including "The Examination" (1840), New Pinakothek, Munich; "The School" (1846) and "Jobs as Night Watchman" (1852), both in Ravené Gallery, Berlin. His "Gaming-Table" is his most important work of a serious nature.

HASENCLEVER, Wilhelm (1837–89). A German Socialist agitator, born in Arnsberg, Westphalia. He received his education at the Gymnasium of his native city and then became a tanner. In 1862 he was chosen editor of the *Westfälische Volkszeitung*, in 1871 president of the Allgemeiner Deutscher Arbeiterverein, and in 1875 presiding officer of the newly organized Socialist-Labor party of Germany. He was elected to the Reichstag several times and controlled or edited various Socialist newspapers.

HASENPFLUG, hä′zen-pflo͞og, Karl (1802–58). A German architectural painter. He was born in Berlin, the son of a shoemaker. After a hard struggle in early life, he became the pupil of the decorative painter Karl Gropius, and a few years later was enabled by a royal stipend to study at the academy. Attracted by the mediæval architecture of Halberstadt, he made his home there in 1830 and, besides cathedrals, painted chiefly views of ruined castles and convents, which appealed to a large public by their poetic charm. Especially noteworthy among his works are two views of Cologne Cathedral (1832–33) and three views of and in Halberstadt Cathedral (1828–36, National Gallery, Berlin). He is also represented at Hamburg, Bremen, Hanover, Vienna, and in various German provincial museums.

HÄSER, hā′zẽr, Heinrich (1811–85). A German medical author, born at Rome, the son of the musician August Ferdinand Häser. He studied medicine at Jena, taught there from 1836 to 1849, then went to Greifswald and in 1862 to Breslau. He edited: Gruner, *Scriptores de Sudore Anglico* (1847); a *Bibliotheca Epidemiographica* (2d ed., 1862); the *Repertorium für die gesamte Medizin* (1840–42); the *Archiv für die gesamte Medizin* (1840–49); and wrote: *Historisch-pathologische Untersuchungen* (1839–41); *Lehrbuch der Geschichte der Medizin und der Volkskrankheiten* (3d ed., 1875–82); *Geschichte der christlichen Krankenpflege und Pflegerschaften* (1857); *Die Vaccination und ihre Gegner* (1854); *Grundriss der Geschichte der Medizin* (1884).

HASHISH, hăsh′ēsh (Ar. *ḥashīshat,* from Ar. *ḥashīsh,* herbage, hay, from *ḥashsha,* to cut grass). The Oriental name of the flowering tops and tender parts of Indian hemp (*Cannabis indica*). Various preparations of the plant are employed for the producing of a peculiar intoxication. A favorite mode of extracting its active principle is by boiling the tops and flowers with water to which butter or oil has been added, evaporating, and thus forming an oleaginous solution or fatty extract. This fatty extract is frequently mixed with other substances which are reputed to possess aphrodisiac properties and is taken in the form of electuary confection, or pastile. The majoon used at Calcutta, the mapouchari employed at Cairo, and the dawames or dawamesk of the Arabs, are preparations of this kind. In India it is employed as a narcotic stimulant under the names hashish, churrus bhang, siddhi, and gunjah. American hemp (*Cannabis americana*) possesses a similar but weaker action. The effect of hashish depends largely upon the individual. Among the Orientals the dreams are often of an erotic character, but this is not so among the western nations. One of the first appreciable effects of the drug is the gradual weakening of the powers of controlling and directing of the thoughts. Then comes the stage already described; and accompanying, and in part following it, there are observed errors of sense, false convictions, and the predominance of one or more extravagant ideas. These ideas and convictions are generally not altogether of an imaginary character, but are suggested by external impressions which are erroneously interpreted by the perceptive faculties. A minute may seem a year, and an hour only an instant. Sounds may be greatly exaggerated. The sense of duration of time and extent of space and the appreciation of personality are lost; there is a sensation of weight in the extremities, and anæsthesia of the skin, which may often become complete. Finally, if the dose is sufficiently powerful, there is marked drowsiness and sleep. The drug is used as a sedative as a substitute for opium. For the relief of pain in neuralgia and migraine, it has been successfully used. It is a valuable hypnotic in delirium tremens and a useful remedy for functional impotence and certain uterine disorders.

HAS′IDÆ′ANS. A Jewish sect. See Chasidim.

HAS′KELL. A city and the county seat of Haskell Co., Tex., 165 miles (direct) west by north of Fort Worth, on the Wichita Valley Railroad (Map: Texas, C 3). The leading industries are farming and stock raising and the manufacture of cotton goods and cotton-oil products. The water works are owned by the city. Pop., 1910, 2436.

HASKELL, Ella (Knowles) (1865–1911). An American lawyer and public official, born at North Ridge, N. H. She studied law and was admitted to the bar. As Miss Knowles, she moved to Montana, became active in politics, and was candidate for Attorney-General on the Populist ticket in 1893, opposing Henry J. Haskell, a Republican. Haskell won the election. She became his assistant and later married him, but a few years later obtained a divorce. Then, having opened a law office in Butte, Mont., she won many notable mining cases and became known as one of the foremost women lawyers in the United States. She was active in woman's club work and was a student of Oriental philosophies.

HASKELL, Mellen Woodman (1863–). An American mathematician, born at Salem, Mass. He graduated from Harvard University in 1883 and (Ph.D.) from the University of Göttingen in 1889. He served as an instructor in mathematics in 1889–90 at the University of Michigan; and as assistant professor in 1890–94, associate professor from 1894 to 1906, and professor after 1906 at the University of California, where he was also dean of the College of Social Sciences (1899–1900) and of the College of Letters (1900–01). He became known especially for his work in modern analytic geometry. He was a member of the Council of the American Mathematical Society in 1907–09, and vice president in 1913.

HASLER, häs′lĕr, or **HASSLER,** Hans Leo von (1564–1612). A German composer, one of the founders of a national German music, born at Nuremberg. He studied with his father, Isaac Hasler, town musician, and in 1584 with G. Gabrieli at Venice. He was the first important German composer who studied in Italy, and his works, despite their originality, were influenced by the Italian style. From 1585 to 1601 he was organist to Count Octavianus Fugger at Augsburg; in the latter year he received the post of court musician at Prague to Emperor Rudolph II. In 1608 he accepted an appointment at the court of the Elector of Saxony. His compositions are of great value in the history of music. Consult A. Sandberger, *Bemerkungen zur Biographie Hans Leo Hasslers und seiner Brüder* (Leipzig, 1905).

HASLINGDEN, hăz′lĭng-den. A manufacturing and market town in Lancashire, England, 4 miles south-southeast of Accrington (Map: England, D 3). It has manufactures of cottons, silks, woolens, sizing of cotton warps, and iron and engineering works. In the neighborhood are coal mines, brick fields, and extensive stone quarries. Situated in a hilly district near the Forest of Rossendale, it derives its name, signifying "Hollow of the Hazels," from the neighboring trees. Its church, restored in 1879, dates from the thirteenth century and has handsome endowed schools attached. Pop., 1901, 18,500; 1911, 18,723.

HAS′MONÆ′ANS. See Maccabees.

HASNER, häz′nĕr, Leopold, von Artha (1818–91). An Austrian statesman and jurist, born at Prague. He studied law at Prague, was appointed professor of the philosophy of law there (1849) and then of political economy (1851), and was elected to the Bohemian Diet and the Austrian House of Deputies in 1861. Two years afterward he was made President of the latter body and head of the Council of Education. In 1865 he became professor of political economy in the University of Vienna; in 1867 he was called to the Austrian House of Peers, of which he was a member for the rest of his life; in 1868 he was appointed Minister of Public Instruction; and for a short time in 1870 he was President of the Ministry. He resigned, but became active as a leader of the Liberal Centrist party in the Upper House. The Austrian public-school system in its present form is a product of his labors. In 1893 a monument was erected in his memory at Ischl, where he died. He wrote: *Filosofie des Rechts und seiner Geschichte in Grundlinien* (1851) and an unfinished *System der politischen Oeko-*

nomie (1861). Consult his posthumously published *Denkwürdigkeiten: Autobiographisches und Aphorismen* (Stuttgart, 1892).

HASPINGER, häs'ping-ẽr, JOACHIM (1776–1858). A Tyrolese patriot, born at Sankt Martin im Gsiess. He studied at Bozen and Innsbruck, fought against the French in 1796, 1797, and 1799–1801, and became a Capuchin priest in 1805. He was an ardent patriot and took a leading part in the rising of the Tyrolese against Bavaria, to which power Napoleon had given their country. In 1809 he distinguished himself by his bravery in a number of encounters with the French, and in 1810 he was second only to Hofer and Speckbacher as a leader in the renewed revolt of that year. In 1810 he was exiled by the Bavarians and went to Vienna, whence he was sent on a secret mission two years afterward to arouse the people of Upper Italy to revolt. He was pastor of a church near Vienna, at Hietzing, from 1814 to 1848, then went into Italy as chaplain to a company of Tyrolese volunteers, lived at Döbling until 1854 and then at Salzburg. He was buried beside Andreas Hofer at Innsbruck. As a member of the Capuchin Order, he had unusually great influence with the people, who called him "Pater Jochem" and "Rotbart." Consult Schallhammer, *Biographie des Tiroler Heldenpriesters Joachim Haspinger* (Salzburg, 1856).

HAS'SALL, ARTHUR (1853–). An English historian, born at Bebington in Cheshire. He studied at Trinity College, Oxford, where he was history exhibitioner in 1876, and the next year won a first-class in the Honor School of Modern History, Oxford. From 1880 to 1883 he was a lecturer and tutor at Keble College and from 1890 to 1892 and again in 1901–03 examiner in the Honor School of Modern History. He was elected a member of the Hebdomadal Council from 1892 to 1896, Censor of Christ Church, 1894–95, and was reëlected member of the Hebdomadal Council in 1897. His publications include: *Life of Bolingbroke* (1889); *Louis XIV* (1895), in the "Heroes of the Nations Series"; *The Balance of Power, 1715–89* (1896), in the series "Periods of European History," of which he was made general editor; *History of France* (1901); *The French People* (1901); *Mazarin* (1903); *The Tudor Dynasty* (1904); *The Expansion of Great Britain, 1715–89* (1907); *Castlereagh* (1908); *The Restoration and the Revolution, 1660–1715* (1911); *The Great Napoleon* (1911); *History of British Foreign Policy* (1912).

HAS'SAM, CHILDE (1859–). An American figure and landscape painter, one of the foremost exponents of impressionism in America. He was born in Boston and studied in the Boston Art School, and later under Boulanger and Lefebvre in Paris, but from the first allied himself with the Impressionistic movement. His range of subjects is wide—street scenes, landscape with and without nudes, and interiors with figures—and his technique is distinctly individual. With a remarkable mastery of color he evolved a system of his own, composed of primary colors juxtaposed in parallel stripes and dashes, the whole giving a remarkably vibrant and brilliant effect. His interiors are unusually charming, and while his nudes are not always convincing, yet they harmonize with the landscape, which is interpreted with much poetic feeling. Hassam received many prizes and gold medals: at Munich (1892), Philadelphia Art Club (1892), Pennsylvania Academy of Fine Arts (1899), Buffalo (1901) and St. Louis (1904) expositions, Carnegie Art Institute, Pittsburgh (1905), and the Jennie Sesnan gold medal, Pennsylvania Academy of Fine Arts (1910). He is represented in the Metropolitan Museum of Art, New York; the National Gallery, Washington; the Walters collection, Baltimore; the Chicago Art Institute; Worcester Museum; Corcoran Art Gallery, Washington, D. C.; Carnegie Art Institute, Pittsburgh; Pennsylvania Academy of Fine Arts, Philadelphia, and nearly every other important gallery in the United States. He joined the group known as the "Ten American Artists," and was elected a member of the National Academy (1906), the Société Nationale des Beaux-Arts, the Secession, Munich, the American Water Color Society, and the National Institute of Arts and Letters. Among his most important works are: "The Little June Idyll" (1906); "Evening Bells," "Winter" (1908); "Aphrodite" (1909); "Summer Idyll" (1910); "Manhattan's Sunset Towers" (1911); "The Butterfly" (1912); "The New York Window" (1913), one of his most charming interiors; "The Strawberry Tea-Set"; "Broad and Wall Streets"; "Summer Sea"; "Lorelei."

HAS'SAR. Any of several of the dorads or mailed catfish of the Orinoco River and its tributaries, which have some extraordinary habits. They make nocturnal journeys in the dry season, from a diminishing pond to another one, or from river to river, overland, often in companies, and to such distances that several nights are consumed in travel. They also construct nests of leaves at the margin of ponds and streams at the beginning of the rainy season, where the eggs are deposited and guarded till they hatch. See CATFISH.

HAS'SARD, JOHN ROSE GREENE (1836–88). An American journalist. He was born in New York City and graduated at St. John's College, Fordham, in 1855. He was one of the editors of the *New American Cyclopædia*, in 1865 edited the *Catholic World*, and in 1866 joined the editorial staff of the New York *Tribune*. He became widely known as a graphic correspondent and also as a musical critic of rare capacity and judgment. After the death of George Ripley (1880) he was also literary editor of the *Tribune*. In 1878, with Grosvenor, also of the *Tribune*, he deciphered the telegrams which were thought to prove corruption on the part of the Democratic National Committee, or of Tilden's friends, in the disputed election of 1876. Among his publications are: *Life of Archbishop Hughes* (1866); *The Ring of the Nibelung* (1877); *Life of Pius IX* (1878); *A Pickwickian Pilgrimage* (1881).

HASSE, häs'se, FRIEDRICH RUDOLF (1808–62). A German Protestant Church historian. He was born in Dresden, June 29, 1808, educated at Leipzig and Berlin, and at the latter university first took up the study of Anselm of Canterbury. In 1834 he began to lecture in Berlin on Church history and went to Greifswald as extraordinary professor of Church history in 1836; thence in 1841 in the same capacity to Bonn, where he became full professor (1849). He made his reputation by his masterly work on Anselm—vol. i, *Life* (1843); vol. ii, *Theology* (1852). He died at Bonn, Oct. 14, 1862. After his death his lecture outlines upon the *Geschichte des alten Bundes* (1863) and *Kirchen-*

geschichte (1864; ed. by W. Engelmann, 1872) appeared. For his life, consult Krafft (Bonn, 1865).

HASSE, Johann Adolph (1699–1783). A German dramatic composer, born at Bergedorf, near Hamburg. In 1718 he became a tenor at the Hamburg Opera, and in 1722 became connected with the Brunswick Theatre, where the next year his first opera, *Antigonus,* was produced. In 1724 he went to Italy, studying with Porpora and A. Scarlatti. In 1731 Augustus the Strong appointed him kapellmeister and director of the opera at Dresden, and his wife, the celebrated singer, Faustina Bordoni, was engaged as prima donna. While in that city, he was involved in a bitter rivalry with Porpora and Mingotti, and it was not until after their departure that Hasse became supreme. At the siege of Dresden, in 1760, he suffered great losses, many of his manuscripts being destroyed. His operas, some of the best of which were composed during his stay in Italy, were extremely popular, among the best of them being: *Sesostrate* (1726); *Attalo, re di Bitinia* (1728); *Dalisa* (1730). In his seventy-fifth year he produced at Milan his last opera, *Ruggiero,* in celebration of the marriage of the Archduke Ferdinand. His music was marked by great naturalness of expression and charming melody. In addition to over 100 operas, he wrote 10 oratorios, 5 Te Deums, and numerous instrumental pieces and sacred compositions. Consult C. Mennicke, *Hasse und die Brüder Graun als Symphoniker* (Leipzig, 1906), and L. Kamienski, *Die Oratorien von J. A. Hasse* (ib., 1912).

HASSELQUIST, häs′sel-kvīst, Fredrik (1722–52). A Swedish traveler and naturalist, born at Törnevalla, East Gothland, and educated at Upsala. In 1749 he visited the Middle East, spending the winter in Smyrna, going the next year to Cairo, where he studied the ebb and flow of the Nile, and later proceeded to the Holy Land. He died near Smyrna, while on his way home. Linnæus published his notes in 1757 under the title *Resa til Heliga Landet förrättad fråu Ar 1749 til 1752* (Eng., Fr., and Ger. trans.).

HASSELT, häs′sĕlt. The capital of the Belgian Province of Limburg, situated on the left bank of the Demer, 50½ miles by rail from Antwerp and 19 miles from the Netherlands frontier (Map: Belgium, D 4). It has manufactures of tobacco, laces, linen, and chicory. The town possesses a theological and a teachers' seminary and an industrial school and is famous throughout Belgium for its great fête held once every seven years on the Feast of the Assumption, August 15, which attracts thousands of pilgrims. The last was held in 1912. Pop., 1900, 15,249; 1910, 16,804. Here the Dutch gained a victory over the Belgians on Aug. 6, 1831.

HASSELT, André Henri Constant van (1806–74). A Belgian historian and poet, born at Maestricht, and educated at Liége and Ghent. He was employed in the Royal Library at Brussels, was appointed inspector of primary education (1843) and of normal schools (1850), and edited the old French *Romans de Cléomadès* (1865). He compiled: *Het gouden Boeksken* (1845); *Cours de littérature française* (1861); *Leçons choises de littérature française* (1865). His prose works include: *Histoire de Rubens* (1840); *Les Belges aux Croisades* (1846); *Histoire des Belges* (1848); and among his poems mention should be made of: *Poésies* (1852–57); *Primevères* (1854); *Poèmes, paraboles, odes et études rhythmiques* (1862); *Les quatre incarnations du Christ* (2d ed., 1872); *Le livre des ballades* (1872). He also wrote juveniles under the pseudonym "Alfred d'Aveline" or "Charles André," and some Flemish poetry under the name "Jan van Limburg."

HASSENFRATZ, ȧ′säɴ′frȧts′, Jean Henri (1755–1827). A French scientist, born in Paris. He studied under Monge, became a geographical engineer (1780), and after three years' study of mining entered Lavoisier's laboratory. He was an ardent Jacobin, a member of the Assembly which decided the fate of the Girondists, and was instrumental in postponing the decree against them. Throughout the Revolution he was active in providing military material, in reorganizing military schools, and in founding the Ecole Centrale de Travaux Publics, in which he was professor of mineralogy and physical geography, and which later became the Polytechnic School. In 1795 he led the bands of the Faubourg Saint-Marceau in their attack on the Convention and had to leave Paris until the general amnesty of that year. In 1794 he became professor of physics at the School of Mines and taught until 1824, when he retired. Besides contributions to the *Annales de Chimie* and the *Journal des Mines,* he wrote: *Manuel militaire* (1790); *Géographie élémentaire* (5th ed., 1809); *Cours révolutionnaire d'administration militaire* (1794); *Tableau de minéralogie* (1796); *Cours de physique céleste* (1803); *Sidérotechnie* (1804).

HASSENPFLUG, häs′*e*n-pflōōɢ, Hans Daniel Ludwig Friedrich (1794–1862). A Hessian Minister, born at Hanau, and educated in law at Göttingen. He was made Minister of Justice and of the Interior (1832) and was an energetic administrator, but a bitter enemy of the Hessian Constitutional party in the Diet and of a free press both of which had been brought into being by the revolutionary spirit of 1830. He was the ultraconservative Metternich of Hesse-Cassel. For five years his absolutist policy was successful, but in 1837 he found himself losing favor at court and left the country. In 1841 he went to Berlin, where he was a member of the judiciary until 1850, when he returned to Cassel as Prime Minister and again fought and finally lost the battle with the Diet. In 1855 Hassenpflug retired to Marburg, where he died seven years afterward.

HASSENSTEIN, häs′en-stīn, Bruno (1839–1902). A German cartographer, born at Ruhla. He was one of the foremost of a band of scientific map makers to whom Germany owes her lead in cartography and was connected with the famous map-making firm of Festus Perthes in Gotha almost throughout his life. He made a specialty of working up material brought home by travelers. His contributions to African and Tibetan cartography have been notable in this respect. His work includes revisions of Fay's *Great Outline of Geography* (1869) and Spruner's *Handatlas* (1871–79); a new atlas of Japan (1885); and in *Petermanns Mitteilungen,* maps of most of the important exploring expeditions since 1878, especially of the country covered by Junker, Emin Pasha, Hans Meyer, and Sven Heden.

HASSLER, häs′lẽr, Ferdinand Rudolph (1770–1843). An American engineer, born in Aarau, Switzerland. He was employed for a time on the trigonometrical survey of Switzerland, emigrated to the United States in 1805, and was acting professor of mathematics at West Point from 1807 to 1810 and at Union College in 1810–11. He assisted in the organization of the United States Coast Survey and was its first superintendent (1815–43). He was afterward at the head of the Bureau of Weights and Measures in the Treasury Department, and the early work of establishing the standards of weights and measures of the United States was in his hands. His publications include a *System of the Universe* (2 vols., 1828) and many valuable reports to Congress on weights and measures, besides several textbooks of science.

HASSLER, Hans Leo. See Hasler.

HASSLER EXPEDITION. The name given to the United States Coast Survey expedition of 1871, in the steamer *Hassler* (see Hassler, F. R.), which was the first important scientific expedition sent by the government for marine exploration. The expedition included Prof. Louis Agassiz and Mrs. Agassiz; Dr. F. Steindacher, ichthyologist; Dr. Thomas Hill, botanist; and Count L. F. de Pourtalès, J. A. Allen, and others. The steamer left Boston Dec. 4, 1871, and reached San Francisco in August, 1872. On the way to St. Thomas surface observations were made. Deep-sea dredging was done at Barbados and along the Brazilian coast. At the Straits of Magellan frequent stops were made, and at particularly interesting places several days were spent, and inland excursions undertaken, especially to examine glaciers. Throughout the route collections were made, and much of this material was deposited in the Museum of Comparative Zoölogy at Cambridge, Mass. Some of the zoölogical results of the expedition have been published by Agassiz, Lyman, and Pourtalès.

HASSUNITES, häs′sụn-īts. A name given to the followers of Anton Hassun (1809–84), an Armenian patriarch. Hassun desired to acknowledge the supremacy of the Pope and attended the Vatican Council of 1870. A considerable number of the Armenians were opposed to Hassun and chose the Bishop Kupelian in his place. After much strife Hassun was banished by the Sultan. Kupelian acknowledged the Pope in 1879, and Hassun, who had been allowed to return to Constantinople, was acknowledged by the government as head of the Armenian Catholics in Turkey. The anti-Hassunites also submitted to the Pope. In 1880 Hassun resigned, went to Rome, was made Cardinal, and died, in Rome in 1884.

HASTINAPURA, häs′tĭ-nä′pōō-rȧ (Skt., Elephant City). An ancient city of India, on the bank of the Ganges, some 50 miles northeast of the present city of Delhi, and probably one of the earliest Aryan settlements outside of the Punjab. Its importance lies in the fact that it forms a central point of the principal scenes of the *Mahābhārata.* It was the residence and capital of the Kuru family; whereas their rival and noble cousins, the Pandus, built their royal city at Indraprastha, or Indrapat, nearly on the site of the modern Delhi. There are but few traces of the ancient city Hastinapura remaining, though tradition points to a group of shapeless mounds as being the residence of the princes of the house of Bharata whose deeds are commemorated in the great national epic.

HASTING, hāst′ĭng. A viking, or sea rover, of the ninth century, to whom legend ascribes most of the deeds performed by the Danish pirates of that time. It is said that in 842 he made his first appearance as a leader, plundering Touraine. From 859 to 863 he was plundering the Spanish and Italian coasts and in the latter country captured Luna by stratagem. In 866 Robert, Count of Paris, fell in battle fighting against Hasting, who was then in the Loire valley. He left this portion of France in 872 and in 889 appeared in the valley of the Somme. In 893 he was defeated by Alfred the Great, with whom he made peace. At that time the two sons of Hasting were baptized. How many of these statements are true cannot be established. No such name occurs in the sagas. Consult Depping, *Histoire des expéditions maritimes des Normands* (Paris, 1844), and Keary, *Vikings in Western Christendom* (London, 1891).

HASTINGS, hāst′ĭngz. A parliamentary and county borough in Sussex, England, on the English Channel, 62 miles southeast of London (Map: England, G 6). It was the premier Cinque Port, but lost its importance after being burned by the French in 1377. It is now a celebrated watering place, largely frequented for its historical interest, picturesque situation, fine sandy beaches, and its healthful, bracing climate. The town depends for its prosperity almost entirely on its visitors, though it has a small fishing industry. It lies in a valley surrounded by hills. St. Leonard's-on-Sea, a western suburban town, has been absorbed and joined to the borough. Hastings has two fine piers, large tepid swimming baths, numerous hotels, good schools, and the somewhat scanty remains of an ancient Norman castle. The marine parade, 3 miles in length, is one of the finest sea walks and drives in the kingdom, and there is also a long covered parade called the Marina. The town owns spacious open grounds on the east and west hills, a beautiful park, three public gardens, the Brassey Institute, with public library, museum, and art schools presented by Lord Brassey, a fish market, cemetery, and excellent well-water supply, and electric-lighting supply, and maintains bathhouses and hospitals. The streets are sprinkled with sea water, which is also supplied to private houses for bath purposes through mains. In 924 Athelstan established a mint at Hastings, then an important place, and there William the Conqueror landed and encamped prior to his famous victory over Harold at Senlac Hill (now Battle Hill), which secured to him the conquest of England, on Oct. 14, 1066. On the spot where Harold fell William founded Battle Abbey. (See Battle Monument.) William I by charter made Hastings one of the Cinque Ports. Hastings had early municipal privileges and received the charter of incorporation from Elizabeth. Pop., 1901, 65,000; 1911, 61,145. Consult: Cooper, *Notices of Hastings* (1862); Burrows, *Cinque Ports* (London, 1888); C. G. Harper, *Hastings Road* (New York, 1906). See Hastings, Battle of.

HASTINGS. A city and the county seat of Barry Co., Mich., 32 miles by rail southeast of Grand Rapids, on the Thornapple River, and on the Michigan Central and the Chicago, Kalamazoo, and Saginaw railroads (Map: Michigan, D 6). It has a public-school library and a fine city hall, courthouse, and jail. The city is of importance as a manufacturing centre, its products comprising flour, furniture, felt boots, power presses, cigars, hose reels, pumps, car seals, carriages and wagons, etc. The water works are owned by the municipality. Pop., 1900, 3172; 1910, 4383.

HASTINGS. A city and the county seat of Dakota Co., Minn., 20 miles by rail southeast of St. Paul, at the junction of the Vermillion River with the Mississippi, and on the Chicago, Burlington, and Quincy, and the Chicago, Milwaukee, and St. Paul railroads (Map: Minnesota, E 6). It is the seat of one of the State asylums for the insane, has a city hospital and courthouse, and is an important distributing centre; its industries include several grain elevators, a malt house and breweries, saw, planing, and flour mills, sash, door, blind, sprayer, time-recorder, and wagon factories, gas engine and boat works, a file factory, etc. A bridge of novel type spans the Mississippi at this point. In order to avoid the business section, which is close to the river, the approach to the bridge proper is built in the form of a spiral. The water works are owned by the city. Pop., 1900, 3811; 1910, 3983.

HASTINGS. A city and the county seat of Adams Co., Neb., 97 miles west of Lincoln, on the Chicago, Burlington, and Quincy, the Missouri Pacific, the Chicago and Northwestern Line, the St. Joseph and Grand Island, and the Union Pacific railroads (Map: Nebraska, F 4). It is the seat of Hastings College (Presbyterian), opened in 1882, and of the State Asylum for the Chronic Insane, and has a fine city hall, the Mary Lanning Hospital, and City, Prospect, and Heartwell parks. The city is surrounded by an agricultural and stock-raising section, has an important trade in grain, and manufactures flour, wagons, etc. Hastings, incorporated in 1874, is now governed under a charter of 1901, which provides for a mayor, elected biennially, and a city council, the members of which are elected one-half by wards and one-half at large. The water works and electric-light plant are owned by the city. Pop., 1900, 7188; 1910, 9338.

HASTINGS, Battle of. The name usually given to the great struggle which took place at Hastings, on Oct. 14, 1066, between the Normans, under William, Duke of Normandy, and the English, under King Harold. Duke William claimed that Harold had agreed to support his claim to the English crown on the death of Edward the Confessor (q.v.), and when this was not done William began preparations to wrest the crown from Harold by force. Harold had just conquered his brother and rival, Tostig, at Stamford Bridge (Sept. 25, 1066), when he heard that the Normans were ravaging the south, and he immediately hastened in that direction. He reached a hill, later called Senlac, on October 13. The Norman army was divided into three parts, of which the left wing consisted of Bretons, Poitevins, etc., the right wing of mercenary troops, and the centre of Norman knights and archers led by Duke William in person and grouped around the banner which the Pope had given. On the English side the best troops were the Hus-carls, or bodyguard of Harold. At nine in the morning the battle began with a shower of arrows from the Norman archers, but no impression was made on the English ranks. The Bretons fled, and a part of the English, contrary to Harold's orders, broke ranks and pursued. William noticed that they became disordered thereby, and he ordered a large part of his army to feign a retreat. The English fell into the trap, broke their ranks, and began to pursue. The Norman centre thereupon was able to direct all its attack upon the bodyguard on the hill, and though the English still fought bravely, Harold's eye was pierced by an arrow, and the battle was lost. William met little vigorous opposition henceforth in his conquest of England. Consult: Freeman, *Norman Conquest*, vol. iii (2d ed., London, 1876); Green, *The Conquest of England*, vol. ii (ib., 1899); Round, *Feudal England* (ib., 1895); Charles Dawson, *History of Hastings Castle* (2 vols., ib., 1910). On the spot where Harold stood William erected Battle Abbey. See Battle Monument.

HASTINGS, Charles Sheldon (1849–). An American physicist. He was educated at Yale University (Ph.B., 1870; Ph.D., 1873), and was instructor there in physics in 1871–73. He then served as associate professor of physics at Johns Hopkins University and in 1884 became professor of physics at Sheffield Scientific School (Yale). He is the author of a *Text-Book on General Physics* (1899), with F. E. Beach, and of *Light: A Consideration of the More Familiar Phenomena of Optics* (1901).

HASTINGS, Francis Rawdon-Hastings, first Marquis of (1754–1826). An English general and statesman. He was born Dec. 9, 1754, was educated at Harrow, and matriculated at University College, Oxford, but entered the army at the age of 19 and was sent in 1773 to America. There he fought in many of the more important engagements of the Revolutionary War and won especial distinction in the battle of Hobkirk's Hill (April 25, 1781). He was made adjutant general of the British forces in America in 1778, Baron Rawdon in 1783, and 10 years later inherited another title from his father, the Earl of Moira. His campaigning in Holland (1794–95) was followed by a term of home service, as master general of ordnance, and he also was most active in the politics of the time. He was Governor-General of India from 1813 to the beginning of 1823. There he showed his mettle in the transformation of the warlike Gurkhas from foes into friends, and he was accused even of exceeding his instructions in the subjugation of native races, to whom, however, he played the amiable despot, encouraging education and civil reform. In recognition of his services in the establishment of British power in India he was made Marquis of Hastings (1816), and he was commander in chief at Malta for the last two years of his life. Consult: Prinsep, *History of the Political and Military Transactions in India during the Administration of the Marquess of Hastings* (London, 1825); Ross-of-Bladensburg, *The Marquess of Hastings* (Oxford, 1893); *The Private Journal of the Marquess of Hastings*, edited by his daughter (reprinted from 2d ed., Allahabad, 1907).

HASTINGS, Frank Abney (1794–1828). An English naval commander, son of Lieut.-Gen. Sir Charles Hastings. He entered the British navy in 1805, but for insubordination was forced to leave it in 1820. He joined the Greek navy in the struggle against the Turks, fought at Nauplia (1822), and the following year drew up a paper containing some of the ideas from which grew the nineteenth-century revolution in naval warfare, embracing a substitution of ironclad steam vessels for wooden sailing craft. In 1824 he bought and equipped a vessel in line with his ideas and with it did great damage to the

Turkish fleet, distinguishing himself especially in the Bay of Salona in 1827. In December of the same year Hastings captured Vasiladi. He died of a wound received at Anatolikon in 1828. Consult Gordon, *History of the Greek Revolution* (Edinburgh, 1832), and Finlay, *History of the Greek Revolution* (ib., 1861).

HASTINGS, Henry, Earl of Huntingdon. See Huntingdon.

HASTINGS, James (c.1860–). A Scottish biblical scholar, born in Huntly, Aberdeen. He was educated at Aberdeen University and at the Free Church Divinity College in Aberdeen, and was pastor at Kinneff, Kincardineshire, in 1884–97, of Willison Church, Dundee, in 1897–1901, and of St. Cyrus Church until 1911. From 1890 to 1913 he edited *The Expository Times.* But he is even better known for the dictionaries and encyclopædias that he edited: *Dictionary of the Bible* (5 vols., 1898–1904; 1. vol., 1908); *Dictionary of Christ and the Gospels* (1906–07); *Encyclopædia of Religion and Ethics* (1908 et seq.); *Dictionary of the Apostolic Church* (1914 et seq.). He also edited two expository series: *The Great Texts of the Bible* (1910 et seq.) and *The Greater Men and Women of the Bible* (1913 et seq.).

HASTINGS, Selina Shirley. See Huntingdon, Selina Hastings.

HASTINGS, Thomas (1860–). An American architect. He was born in New York City and graduated from the Ecole des Beaux-Arts, Paris, in 1884. He immediately afterward entered into partnership with John M. Carrère (q.v.). The firm of Carrère and Hastings designed the Ponce de Leon and Alcazar hotels at St. Augustine, Fla., the Central Congregational Church at Providence, R. I., the Mail and Express and Edison buildings, and the New Theatre (later Century Opera House), all in New York, the New York Public Library, the Senate Offices at Washington, D. C., and many other notable buildings. Hastings was appointed to the Commission of Fine Arts, was elected a member of the National Academy (1909) and of the American Academy of Arts and Letters, and became Chevalier of the Legion of Honor.

HASTINGS, Warren (1732–1818). An English statesman and the first Governor-General of India. Descended from an ancient family long settled at Daylesford in Worcestershire, he was born at Churchill in Oxfordshire on Dec. 6, 1732. He was early left an orphan, but when only seven years old he resolved to recover the estate which had passed out of the possession of his family. Entering Westminster School at the age of 12, he became an excellent scholar, and at 17 he was sent to Calcutta in the secretarial service of the East India Company. In 1758 he was appointed Resident at the court of Murshidabad in recognition of his services under Colonel Clive in recovering possession of Calcutta. Three years later he was appointed to the Calcutta Council, in which he showed himself a man of marked integrity and strenuously opposed the measures of his mercenary colleagues until 1764, when he resigned and returned to England. In 1769 he again went to India, on his appointment as second in the Council at Madras, and in 1772 he became president of the Supreme Council of Bengal. When a little later Parliament created a governor-generalship of India, it bestowed that office upon Hastings, who entered upon his duties at the beginning of 1774. From the first there was discord between him and his council, who seemed determined to encompass his downfall. The finances of his government were in a disordered state, and the incessant demands of the East India Company for money led to some alleged unscrupulous expedients for raising funds. Siraj-ud-Daula, Nawab of Oudh, having a claim upon the rich provinces of Katahr, occupied by the Rohillas, asked of Hastings military aid in subduing these people. Hastings granted the request, as in fact a treaty with the Nawab required, and received for the service a large sum of money, which he used to supply a deficit in the Bengal treasury. The Nawab treated the conquered with great severity in spite of the intercession of Hastings. The condemnation and execution of the ambitious, intriguing Brahman, Nanda Kumar, is perhaps unjustly laid at his door. But to raise more money Hastings deposed Chait Singh, Rajah of Benares, for disloyalty and insurrection, and confiscated his possessions. He made an agreement also with Asaph-ud-Daula, son of Siraj-ud-Daula, under which he deprived the mother and grandmother of the Nawab of extensive domains which had fallen irregularly into their hands. The administration of Warren Hastings, although he was constantly trammeled by orders from home and frequently borne down by an able and factious majority in his own council, was vigorous and successful, and his conduct of military affairs was no less efficient. He broke the power of Hyder Ali, Rajah of Mysore; he organized a system by which justice was dispensed, the revenue collected, and peace maintained. It is greatly to his credit, too, that he encouraged Asiatic learning. When he resigned his office and left India in the spring of 1785, that great empire was tranquil. A treaty had been concluded with Tippu Sahib, son and successor of Hyder, and the Carnatic had been evacuated by the armies of Mysore. On his arrival in England he was received with distinction by George III and the court. The directors acknowledged his services by a unanimous vote of thanks. The Whig opposition, spurred on by Philip Francis, the inveterate foe in the Indian council, was, however, loud and vehement against him and succeeded in carrying in the Lower House a motion for his impeachment at the bar of the House of Lords. The trial began in Westminster Hall, Feb. 12, 1788, the managers of the impeachment being Burke, Fox, Sheridan, Windham, and Charles (afterward Earl) Grey. Burke opened the proceedings in a speech which extended over four sittings; Fox and Grey urged the charge respecting Chait Singh; and Sheridan was intrusted with the conduct of the article relating to the begums or princesses of Oudh. The interest taken by the public in the impeachment began to decline after these great displays of rhetoric. The trial, notwithstanding, lasted for upward of seven years. On April 23, 1795, it terminated in the acquittal of Hastings. Of 400 peers only 29 voted.

Hastings passed the last 24 years of his life at Daylesford in the pursuits of literature and in the occupations of a country gentleman. He died on Aug. 22, 1818, in his eighty-sixth year, and was buried behind the chancel of the parish church of Daylesford. A man of great industry, with an extraordinary capacity for administrative details, he undoubtedly labored for the good of India, often, however, by questionable methods. To him the English government is largely indebted for its political and judicial organization of India and for its method of Indian administration. Instead of receiving his due meed of praise, he was made the scapegoat for the sins of the East India Company. Consult: *History of the Trial* (London, 1796); *Debates of the House of Lords* (ib., 1797); Gleig, *Memoirs of the Life of Warren Hastings* (3 vols., ib., 1841), containing original documents; Bond, *Speeches of the Managers and Counsel* (ib., 1859–61); Trotter, *Warren Hastings* (ib., 1878); Stephen, *Story of Nuncomar and Impeachment of Sir Elijah Impey* (ib., 1885); *The Minutes of Evidence* (ib., 1886); Strachey, *Hastings and the Rohilla War* (Oxford, 1892); Forrest, *The Administration of Warren Hastings* (Calcutta, 1892); Malleson, *Life of Warren Hastings* (London, 1894); Lawson, *The Private Life of Warren Hastings* (new ed., ib., 1911); Lyal, *Warren Hastings* (ib., 1902); *Letters of Warren Hastings to his Wife*, edited by Grier (Edinburgh, 1905); Hastings, *A Vindication of Warren Hastings* (London, 1909). Macaulay's famous *Essay on Warren Hastings* is a flagrant injustice to Hastings.

HASTINGS, Lord William (c.1430–83). An English soldier in the service of King Edward IV. He was the son of Sir Leopold Hastings, and upon his father's death succeeded to landed estate in Warwickshire and Leicestershire. Upon the accession of Edward IV to the throne in 1461 he rewarded Hastings, who, during the Civil War, had been a faithful friend and retainer of his father, the Duke of York, with lucrative offices and grants of land. He was an energetic soldier in all the King's wars, besides being an ambassador and negotiator for him on various occasions. He fought in Edward's Scottish campaigns, and upon Warwick's invasion aided the King in escaping, raised forces in his behalf, and after his return commanded part of the army at the battle of Barnet. Having invaded France in 1475, he obtained a treaty of peace and an annuity from the French King. After the death of Edward IV he was accused of treason by the Duke of Gloucester and beheaded.

HASTINGS SAND. See Wealden Formation.

HASTINGS UPON HUDSON. A village in Westchester Co., N. Y., 3 miles north of Yonkers, on the New York Central and Hudson River Railroad (Map: New York, B 2). It contains the New York Orphan Asylum Society and there are manufactures of copper-wire cable, sheet and tube copper and brass, asphalt paving bricks, dyestuffs and chemicals, etc. Pop., 1900, 2002; 1910, 4552.

HASTY PUDDING. A humorous poem, by Joel Barlow, published in 1796.

HASWELL, hăz'wel, Charles Haynes (1809–1907). An American civil, marine, and mechanical engineer, born in New York City. He learned his profession in a steam-engine factory and in 1836 was appointed the first chief engineer in the United States navy. During his service, which lasted until 1850, he was a member of the boards which designed the *Missouri*, the *Mississippi*, and six other steam frigates. The *Mississippi* was the flagship of Commodore Perry on the expedition to Japan in 1853. He built the first practicable steam launch (1837) and was the first to use zinc to protect iron vessels and marine steam boilers from the galvanic action of salt water and copper. He designed the engines of the *Powhatan*, *Saranac*, and *San Jacinto* and coöperated in designs of the *Michigan* and *Susquehanna*. He was in full control at the time when paddle wheels were being replaced by screws for propulsion, and wood replaced by iron for hulls. He left the navy before the age of steel. He superintended the construction of the crib bulkhead at Hart's Island and after 1898 was the consulting engineer of the board of public improvements in New York City. His publications include: *The Mechanic's and Engineer's Pocket Book* (1842; 74th ed., 1913); *Mechanic's Tables* (1854); *Mensuration and Practical Geometry* (1856); *Reminiscences of an Octogenarian of the City of New York, 1816 to 1866* (1896).

HASWELL, William A. (1854–). A British zoölogist, born and educated in Edinburgh. In 1880 he became curator of the Queensland Museum, in 1882 demonstrator in Sydney University, and in 1890 professor of biology there. He published a standard *Text Book of Zoölogy* (1897, with Parker) and *A Manual of Zoölogy* (1899).

HAS'ZARD, Francis Longworth (1849–). A Canadian jurist and administrator. He was born at Bellevue, Prince Edward Island, and was educated at Prince of Wales College, Charlottetown. He was called to the bar in 1882, and in 1895–1900 was judge of the city court, Charlottetown, of which city he afterward became recorder. In 1904–11 he was a Liberal member of the Provincial Legislature; in 1905 was appointed a member of the Provincial Ministry (without portfolio); in 1908 became Premier and Attorney-General; and in 1911 was made a judge of the Prince Edward Island Supreme Court. He became a member of the Royal Conservation Commission in 1909, and in 1910 was a delegate to the Interprovincial Conference at Ottawa.

HAT (AS. *hæt*, Swed. *hatt*, Dan. *hat*). A general word for head covering, especially one easily removable, with crown and brim. While no ancient hats have been preserved, we have illustrations of many, varying from feathered headdresses to the tall cylinders worn by Hittite kings and queens. Most common of all were round hats, often with a narrow brim, sometimes with a low crown, and sometimes with a high crown. By the Greeks and Romans hats were much less worn than by modern Europeans and Americans. The classic *causia* was a felt hat with high crown and broad brim slightly rolled. The *petasus* was a broad-brimmed hat of felt with low crown, tied on either under the chin or behind the ears, and worn principally by travelers. The *pileus* was also of felt, but more like a modern cap, sometimes as simple as a skullcap. The principal head covering of Greek and Roman ladies was a veil, supplemented in cold or wet weather by a hood of linen in summer and of wool in winter, usually square in shape and untailored.

The hats of the early Middle Ages were comparatively simple caps or hoods, but in the fourteenth and fifteenth centuries extravagant and eccentric shapes and proportions were developed. Straw hats that started in the eleventh century with mushroom brims and round tops trimmed with colored materials and finished at the top with a spike or button developed pointed crowns in the fourteenth. The close helmet-shaped cap of the twelfth century, with a falling point from the crown, was succeeded in the thirteenth by a hat with high crown, peaked front, and turned-up back, and in the fifteenth by a straight-up high hat often brimless. The common cap with folded brim had a loose crown that began to fall over on one side in the eleventh century; reached in loose folds, with serrated or foliated edges, to the shoulder in the fourteenth; and in the fifteenth often dropped as far as the knee in a long thin point. Towards the end of the fifteenth century, low-crowned flat hats with turned-up brim came in vogue. They were generally worn tilted to one side and often over a scarlet skullcap. A large bunch of plumes in front, curving backward, added greatly to the effect. On most of the tall hats, some like those of to-day but more belled at the top and with rolled and padded brim, the feather was generally at the back. In the fifteenth century the eccentric fashions of female millinery surpassed even those of the eighteenth century and of to-day. There seemed to be no limit to the altitude of peaks and cornucopias and baskets set upon the head. Weirdest of all were the creations with high receding crown flanked by huge horns. From the brims or lower edges hung veils of finest muslin, sometimes draped simply, but sometimes arranged on wire frames in portentous shapes. In the first part of the sixteenth century flatness reigned. Women wore caps of velvet or gold brocade, sometimes with padded front, with velvet falls reaching to the shoulder, or picturesquely shaped in set-out effects. The broad brims of men's hats were usually serrated, and the tam-o'-shanter shapes of the upper classes were worn tilted and adorned with feathers. During the reign of Queen Elizabeth men's hats became narrower, with turned-down curved brim and fuller crown encircled with a gold band or set with a feather on the right. Also in vogue were small tight-fitting round hats with rolled brim and feather in front. Women's head coverings had already grown to look more like hats and had a brim curved in over the brow. Falls of velvet, silk, or veiling were crowded out by the Elizabethan lofty neck ruffs and collars. There were also hats with full gathered crowns, tall hats with feather at the side, and many eccentric shapes.

During the reign of James I the brims of men's hats broadened and feathers were placed fantastically at the back and sides of the high crown. Brims were often fastened up on the right side with a jewel. In the reign of Charles I crowns were a little lower, but brims were variously curved and feathers were worn falling over them to the side or back. In the reign of Charles II high-crowned hats with band and bow in front, with flat, waved, or curved brim and with feathers on either side or all round, were the fashion. Sometimes the brim was turned up at the sides and in front, forming the three-cornered hat that flourished for over a century, but was replaced by the top hat at the beginning of the nineteenth century. During that century were developed and standardized the tall hats with straight crowns, made originally from fine fur and later of silk plush, and also the stiff felt hats with round crowns that are chiefly worn to-day, supplemented by straw hats of various shapes and qualities for summer, and by soft felt hats and cloth caps for country or occasional wear and for sports.

Political and religious differences have often been marked by the form of hats. The Puritan of the reign of Charles I adopted the steeple hat, high and narrow, with a broad brim, and devoid of ornament, while the Cavalier wore a lower and broader crown, with a feather stuck on one side. The Quaker hat, low in the crown, with a broad brim, and plain, dates from the origin of the sect at the middle of the seventeenth century.

Hat Manufacture. The history of hat manufacture in the United States dates back to early Colonial days. In 1662 the Assembly of Virginia enacted a law offering 10 pounds of tobacco for every good wool or fur hat made in the Colony. In 1675 laws were passed prohibiting the exportation of raccoon furs from the provinces. By 1731 the industry had become of so much importance as to interfere with the trade of the English manufacturers, who petitioned Parliament to forbid the importation of hats from the American Colonies. A special committee to which the petition was referred reported that in New York and New England 10,000 beaver hats were manufactured annually, and that there were 10 hatters in the single city of Boston, one of whom made 40 hats a week. In accordance with the spirit of this petition, laws were passed forbidding the exportation of American hats to other English colonies, forbidding the manufacture of hats by any person who had not served an apprenticeship of seven years at the business, and forbidding negroes from working at the business. But in spite of these hampering restrictions the industry continued to thrive and to be encouraged by the various Colonial governments. Delaware, in 1753, offered a prize of 40 shillings for the neatest and best hat manufactured in the lower counties. Carolina, by 1767, had developed a flourishing hat industry, with a large export trade to the Spanish islands. Soon after the close of the Revolution the manufacture of hats had become of great importance in Pennsylvania, and from that time the industry has continued to flourish. The principal centres of hat manufacture in the United States to-day are Philadelphia and Reading in Pennsylvania, Newark and Orange in New Jersey, Brooklyn in New York, Danbury, Bethel, and Norwalk in Connecticut.

Felt hats are made in a wide range of qualities. The finer and more expensive grades are entirely of fur; the commoner grades use a mixture of fur and Saxony wool; and for the lowest kinds wool alone is employed. The processes and apparatus necessary for making hats of fur differ also from those required in the case of woolen bodies, and in large manufactories machinery is generally employed for operations which formerly were entirely manual. Hatter's fur consists principally of the hair of rabbits (technically called coneys) and hares, with some proportion of nutria, musquash, and beaver's hair, though the latter material has been for many years extremely scarce, and generally any parings or cuttings from furriers are also used. Furs intended for felting are deprived of their long coarse hairs, after which they are treated with a solution of nitrate of mercury, an operation called carroting or secretage, whereby the felting properties of the fur are greatly increased. The separation of the fur from the skin is effected by cutting the skin into shreds by means of rapidly revolving shear blades, fixed just below a table, but so adjusted that, as the skin passes under a roller or guide fixed above the shear blade, it drops beneath the machine, while the fur, without the apparent displacement of a fibre, passes on the other side of the roller, whence it is removed and packed away until required. Different kinds and qualities of fur are next mixed to produce the quality of hat desired—an operation which is accomplished by means of a machine called a "devil," in which the fibres are pulled apart and thoroughly mingled. The fur is next taken to a blowing machine, where it is kept constantly agitated in a light current of air. The matted pieces and those to which skin adheres, together with the hair and dirt thrown out from the fine fur, drop through a set of sieves which separate the valuable pieces of fur for further treatment. The blowing process continues until the fur is perfectly free from extraneous matter, when it leaves the machine in a lap, fine and soft, but so light and filmy that it hardly bears the touch. As the fur comes from the blower it is weighed out into boxes, each of which contains fur enough for one hat. Each box of fur is now passed on to a former, a machine which consists of a revolving cone made of brass or copper, of suitable size for the hat body. The cone is pierced with innumerable small holes, through which a current of air is drawn by means of an exhaust fan. There is also an arrangement by which minute jets of hot water are thrown upon the newly formed hat body to give it sufficient consistency to permit its removal from the cone. The fur is fed through a tube to a revolving cylinder, which thoroughly opens and distributes the fur into the machine and spreads it evenly over the surface of the cone, which during this operation is inclosed in a tight box. When the fur is properly distributed, the box is opened, the jets of water are thrown upon the fur, and the embryo hat, over which a cloth is spread for its protection, is removed by hand. The whole operation takes but two or three minutes. The fur is then rolled and pressed, first by hand and then by machinery, to felt it and reduce it to its proper proportions. In the meantime it is sized to add to its strength and durability. An application of shellac dissolved in alcohol is used, a much stronger solution being required for a derby than for a soft hat. Thus far the hat has retained its conical form, but the next step is to give it the hat shape. It is placed upon a mold, consisting of a block and a matrix, which shapes both the crown and brim. The next step is dyeing, after which the hair receives further shaping upon another block. This final block is adjustable, so that all the dimensions of a hat—size of band, height and diameter of crown, and width of brim—are accurately gauged by levers, so that, of a given shape, every size can be made on the same block. Pouncing, which is a process of sandpapering to remove inequalities, follows, and is accomplished by placing the hat on a rapidly revolving block and rubbing the surface with fine emery paper. The trimmings—i.e., the sweatband, the lining, and the ribbon binding—are now attached and the hat given another shaping upon the block.

Wool hats are made by a different initial process. The wool, as it comes from the card in a continuous lap, is wound upon a machine consisting of two cones placed base to base and revolving upon an axis placed parallel to the end of the card. The double cone is so rotated that the continuous lap of wool is wound in a zigzag manner, crossing and recrossing from end to end. When a sufficient quantity of wool has been received, the machine is stopped, the double cone of wool is divided in the centre, the two resulting hat bodies removed for felting, and the process repeated. The processes of felting, dyeing, stiffening, blocking, finishing, and trimming follow.

Silk hats have a light stiff body, covered with silk plush of a brilliant glossy texture, the manufacture of which is the most important element in the industry. Originally the bodies were made of felt and various other materials, but now calico, muslin, or other cotton material is almost exclusively used. The muslin is first stiffened with a varnish of shellac and then cut into pieces sufficient for crown, side, and brim. The sidepiece is wound round a wooden hat block, its edges are joined by hot ironing, and the crownpiece is put on and similarly attached to the side. The brim, consisting of three thicknesses of muslin cemented together, is now slipped over and brought to its position and then a second sidepiece and another crown are cemented on. The whole of the body, thus prepared, now receives a coat of size; subsequently it is varnished, and it is ready for the operation of covering. In covering this body the under brim, generally of merino, is first attached, then the upper brim, and lastly the crown and side sewed together are drawn over. All these by hot ironing and stretching are drawn smooth and tight, and as the varnish of the body softens with the heat, body and cover adhere to each other at all points without wrinkle or pucker. Dressing and polishing, by means of damping, brushing, and ironing, come next, after which the hat is velured in a revolving machine by the application of haircloth and velvet velures, which cleans the nap and gives a smooth and glossy surface. The brim has then only to be bound, the linings inserted, and the brim finally curled, when the hat is ready for use.

The value of fur and felt hats manufactured in the United States was, in 1909, $47,869,000, and in 1913 approximated $50,000,000. The value of the straw hats manufactured in the United States was, in 1909, $21,624,000.

For the straw hats made in the United States the braid is chiefly imported from Italy, China, and Japan. It is sewed by machinery and shaped on a block, the pressing being done by machinery. A sizing of glue is used to stiffen the hat before it is pressed. See STRAW MANUFACTURES. For the history of hats consult Rhead, *Chats on Costume* (London, 1906), and Hughes, *Dress Design* (ib., 1913). See HEADDRESS.

HATASU, hä′tȧ-sōō, or **HATSHEPSET**, hȧ-chĕp′sĕt (HATSHEPSU). An Egyptian queen of the eighteenth dynasty, also called Ramaka (or Ma-ka-ra) and Chnemt Amum, who flourished about 1500 B.C. The daughter of Thotmes I, she was associated with him in the last years of his reign; became the concubine of his son Thotmes II, who succeeded his father; and as guardian of his son, later Thotmes III, to whom she married her daughter, exercised a great influence over his brilliant reign and was for some time practically sovereign, as is typified by her appearance on the monuments in male garb. The mutilation of her name in inscriptions points to a falling out between her and the young King, and probably to his complete assumption of power. From southern Arabia an expedition sent out by Hatasu brought back rich treasure. The temple near Thebes, called Der el-Bahri, which is approached by a lane of sphinxes and is surrounded by obelisks, contains many of the records of her reign and an especially vivid representation of the expedition to Punt.

HATCH, Edward (1832–89). An American soldier in the Civil War, born in Bangor, Me. He was educated at the Norwich Military Academy (Vt.) and volunteered for service as a private in the Union army at the outbreak of the Civil War. He assisted in raising the Second Iowa Cavalry, of which he became colonel in June, 1862. He served under General Grant in the South, and after commanding the entire cavalry division in the Army of the Tennessee he was made brigadier general (1864). His gallantry in the field caused his further promotion to the rank of brevet major general (1864) and his transference from the volunteer to the regular army corps as colonel of the Ninth United States Cavalry (1866). He succeeded Gen. Gordon Granger as commander of the Department of Arizona (which included New Mexico) in 1876, negotiated a treaty with the Ute Indians in 1880, and became widely known as an Indian fighter.

HATCH, Edwin (1835–89). An English theologian, born at Derby. He was educated at Pembroke College, Oxford; was ordained deacon in 1858 and priest in 1859; from 1859 to 1862 was professor of classics in Trinity College, Toronto, Canada; from 1862 to 1867 rector of the Quebec High School; and from 1867 to 1885 vice principal of St. Mary Hall, Oxford. In 1883 he became rector of Purleigh, Essex, and in 1884 university reader in ecclesiastical history and secretary to the boards of faculties. He was Bampton lecturer in 1880, Grinfield lecturer on the Septuagint from 1882 to 1884, and Hibbert lecturer in 1888. The degree of D.D. was conferred upon him by the University of Edinburgh in 1883. He was a founder (1870) and the first editor of the *Official Gazette*. In theology he was an independent thinker, who sought to effect at Oxford a scientific basis for that study. He published *The Student's Handbook to the University and Colleges of Oxford in 1873* (7th ed., 1883), but *The Organization of the Early Christian Churches* (Bampton Lectures, 1881) was his first important volume. This was rendered into German, by the eminent Dr. Harnack, as *Die Gesellschaftsverfassung der christlichen Kirchen in Alterthum* (Giessen, 1883). Other works by him were: *The Growth of Church Institutions* (1887); *Greek Influence on Christianity* (Hibbert Lectures, ed. by Dr. Fairbairn, 1890); *Essays in Biblical Greek* (1889); *A Concordance to the Septuagint* (1892–97, with Redpath); *The God of Hope* (1890), a volume of sermons, with a memoir. His writings were important for researches in early Church history. Consult an article by Harnack in the *Theologische Litteratur Zeitung* (Leipzig, 1890).

HATCH, John Porter (1822–1901). An American soldier, born in Oswego, N. Y. He graduated at the United States Military Academy in 1845 and had his first active service as a second lieutenant in the Mexican War. He was brevetted first lieutenant for gallant service in the battles of Contreras and Churubusco, and captain for bravery at Chapultepec. He was made a brigadier general of volunteers in September, 1861, led a brigade in the first battle of Bull Run, and then took command of the cavalry under General Banks. He was wounded in the second battle of Bull Run, but recovered and commanded a division in the battle of South Mountain, where he was shot in the leg and had two horses killed under him. In 1864 he was assigned to the Department of the South, where he had charge of the coast division, operated with General Sherman, and took part in the attack on Charleston, of which city he had command after its capture. He was brevetted major general of volunteers in 1865, became colonel of the Second Cavalry in 1881, and retired in 1886, having fairly won the reputation of an unusually able and efficient cavalry officer.

HATCH, Rufus (1832–93). An American banker, born in Wells, York Co., Me. Removing to Illinois, he was first a clerk in a grocery store at Rockford, after which he joined a surveying party on one of the earliest railroads in Wisconsin, and finally, in 1854, entered the grain commission business in Chicago, where he rapidly accumulated a fortune. In 1862 he removed to New York City, where he established a stock-brokerage business and became well known as a dealer in and promoter of railway stocks. He managed the famous Chicago and Northwestern deal in 1868, secured control of the Pacific Mail Steamship Company, and finally, after varying fortunes, failed in the Northern Pacific collapse in 1883.

HATCH, William Henry (1833–96). An American lawyer, born at Georgetown, Ky. He was admitted to the bar in 1854; served in the Confederate army during the Civil War and rose to the rank of lieutenant colonel; was member from Missouri in the United States House of Representatives from 1879 to 1895, and during this time took a leading part in securing legislation for the benefit of the agricultural interests. He was largely responsible for the passage of the act, commonly known as the Hatch Act, granting Federal aid to agricultural experiment stations in all the States and Territories.

HATCH'ELL. See Hackle.

HATCH'IE. A tributary of the Mississippi River. See Big Hatchie.

HATCH'MENT, or **ACHIEVEMENT** (formerly *atchment, achement, atcheament*, an abbreviation of *achievement*, Fr. *achèvement*, from *achever*, OF. *achever, achiever*, to achieve, from *venir a chief*, Fr. *venir à chef*, to cȯme to the head, or end). In heraldry, an escutcheon or armorial bearing; specifically, the armorial bearing placed, in sable surrounding, on the residence (sometimes the church) of a person lately deceased. The funeral hatchment is in the form of a lozenge, upon which the shield is placed. The crest and other accessories are given, but in place of the motto a text or other religious legend is used. For a bachelor the whole of the lozenge background is black. In the hatchment of an unmarried lady the legend is omitted and a knot of ribbon takes the place of the crest. The hatchment of a husband whose wife survives impales his arms with his wife's in a shield with the external ornaments to which he is entitled, the ground of the hatchment being, under his side of the shield, black, and under his wife's, white. If the wife be an heiress, her arms are not impaled, but carried in an escutcheon (q.v.) of pretense. The arms of a wife whose husband survives are impaled with her husband's arms in a shield or, in the case of an heiress, borne on an escutcheon of pretense. There is no helmet, crest, or mantling, but a peeress is entitled to her robe of estate. The ground under the dexter side of the shield is white, and under the sinister, black. The hatchment of a widower differs from that of a husband in that the ground is entirely black. The hatchment of a widow differs from that of a wife, both in having the ground entirely black and in the form of the escutcheon, which (except in the case of an escutcheon of pretense) is lozenge-shaped. The arms are encircled by a silver cordon or cordelière, the symbol of widowhood. On the decease of the last of a family, a death's head surmounts the shield in place of a crest.

The achievement of a reigning king or queen, whether married or not, represents the royal arms complete on a ground entirely black. That of an archbishop or bishop has the insignia of his see impaled with his paternal arms, the whole surmounted by a mitre, and the ground is per pale argent and sable. The dean of a cathedral or collegiate church and a king-at-arms also impale the arms of office with their family arms. In the achievement of the wife of a prelate there are two shields; the first contains the impaled arms of the see and the bishop, surmounted by a mitre, and the second the family arms of the bishop with those of his wife. In these the ground is all white, save that part which is under the arms of the wife.

Funeral escutcheons in Scotland, France, and Germany differ considerably from those in use in England in that they indicate not merely the right of the deceased to a coat of arms, but his gentility of descent. The hatchment is much larger, sometimes consisting of a lozenge above 6 feet square, and the arms of the deceased, which occupy the centre, are surrounded by those of the 8 or 16 families from whom he derived his descent, the paternal quarterings on the right side and the maternal on the left. The deceased is not entitled to a hatchment unless all these families had a right to bear arms. On the four corners are death's heads and the initials and titles of the deceased; the black interstices are powdered with tears. See Heraldry.

HAT CREEK INDIANS. See Shastan Stock.

HAT′FIELD, or more properly Bishop's Hatfield. A market town in Hertfordshire, England, on the Lea, 7 miles southwest of Hertford. Pop. of parish, 1901, 7551; 1911, 8592. It is noted for Hatfield House, the seat of the Marquis of Salisbury, built on the site and containing remains of the famous palace of the bishops of Ely erected in the twelfth century. It was acquired by Henry VIII. Queen Elizabeth was called to the throne while a resident of the palace; James I also resided here, and it was one of the prisons of Charles I. The present stately Elizabethan mansion, built 1608–11 and situated in extensive and beautiful grounds, contains valuable portraits and historical manuscripts. Consult Brewer, *English Studies*, edited by Wace (London, 1881).

HATFIELD, Edwin Francis (1807–83). An American Presbyterian clergyman, born in what is now Summit, N. J. He graduated at Middlebury College in 1829, studied theology at Andover, and was ordained in New York in 1832. He then became pastor successively of the Second Presbyterian Church in St. Louis and of the Seventh and North Presbyterian churches in New York. Ill health obliged him to give up preaching in 1863. He was for a time agent for Union Theological Seminary, for which he raised a large sum of money, and for many years clerk of the Presbyterian General Assembly. He was the author of: *Universalism As It Is* (1841); *Saint Helena and the Cape of Good Hope* (1852); *The History of Elizabeth, N. J.* (1868); *The Church Hymn-Book, with Tunes* (1872); *The Poets of the Church* (1884). He left his library of 6000 volumes to Union Theological Seminary.

HATH′AWAY, Anne, or Agnes. The maiden name of Shakespeare's wife. See Shakespeare.

HATH′ERLEY, William Page Wood, first Baron (1801–81). An English jurist, born in London and educated at Winchester and at Trinity College, Cambridge. He entered Lincoln's Inn in 1824, was called to the bar in 1827, and was queen's counsel 18 years later. He entered Parliament for Oxford in 1847, became a power in Church matters, and, though not a polished speaker, was highly respected for his knowledge and conscientiousness. From being a judge and a baronet he rose to be a peer of the realm and Lord Chancellor of Great Britain (1868), but retired in 1872. His personal benevolence influenced his parliamentary career, and his piety is apparent in his published works, such as *Truth and its Counterfeits* (1857) and *The Continuity of Scripture* (1867).

HATHOR, hä′thôr. An Egyptian goddess. See Athor.

HATIFI, hä′tē̇-fē̇, Abdallah (c.1460–1521). A Persian epic poet, nephew of Jami (q.v.), born at Khargird in Herat. The last of the important epic poets, he wrote in rhymed couplets five poems: *Lailā u Majnūn*, a story of unhappy love (ed. by Jones, 1788; and in lithograph, Lucknow, 1862); *Haft Manzar*, or the "Seven Races," an imitation of Nizami's *Haft Paikar; Shirīn u Khusrau*, a tale of the love of a Hindu prince for a rajah's daughter and remarkable as being based on contemporary fact and not on conventional legend; *Tīmur Nāmah*, or *Zafarnāmah*, celebrating the deeds of Timur, or Tamerlane, the most important historical epic after the *Shāhnāmah* of Firdausi, of which a part was published by Jones (1788; lithographed at Lucknow, 1869); and an uncompleted story of the glories of Shah Ismail. This pentad is one of the many imitations of Nizami's *Kḥamsah*. Hatifi is also the name of an earlier Persian poet, who wrote *Gui u Chaugān*, a poem on the relation of man to God under the figure of the ball and the racket—though afflicted and beaten, he must turn again to him who smote; and again of a Turkish poet of Amasia in Asia Minor, who wrote in the sixteenth century.

HATS. See Hat.

HATS. A political party in Sweden. See Caps and Hats.

HATSHEPSET, or **HATSHEPSU.** See Hatasu.

HATTALA, hä′tä-lȧ, Martin (1821–1903). A Czech philologist, born in the County of Arva, Hungary. He studied at Pressburg and Vienna, was teacher in the Pressburg Gymnasium (1850–54), instructor (1854), and later professor of Slavic philology in the University of Prague. His writings comprise studies in Czech and Slovak phonetics, syntax, and stylistic, a defense of the authenticity of the manuscripts of Kralove-Dvor (Königinhof) and Grünberg; violent attacks on Schleicher and others; and, with A. Patera, *Reliquiæ Metricarum Alexandreidon Pa-*

læobohemicarum (1881). To-day his works have no scientific significance.

HAT′TERAS, Cape. See Cape Hatteras.

HATTE′RIA, or Sphenodon. A genus of New Zealand "lizards," described in more detail under Tuatara (q.v.), which is the sole remaining representative of a very ancient group of reptiles.

HATTIESBURG, hăt′ĭz-bûrg. A city and county seat of Forrest Co., Miss., 116 miles by rail northeast of New Orleans, on the New Orleans and Northeastern, the New Orleans, Mobile, and Chicago, the Mississippi Central, and the Gulf and Ship Island railroads, and on the Leaf River (Map: Mississippi, G 8). Hattiesburg is the seat of the Mississippi Normal College and the Baptist Woman's College. It is one of the largest yellow-pine centres in the South and has railroad shops, a cotton compress, a wood-reduction plant, machine shops, and manufactures of lumber, fertilizers, mattresses, etc. The city adopted the commission form of government in 1910. The water works are the property of the municipality. Pop., 1900, 4175; 1910, 11,733; 1914 (U. S. est.), 14,952.

HATTI SHERIF, hät′tė shȧ-rēf′, or **HATTI HUMAYUN**, hōō′mȧ-yōōn′ (Turk., excellent writing, from Ar. *khaṭṭ*, script, line, from *khaṭṭa*, to trace, and *šarīf*, sublime). The name given by the Turks to important rescripts of the Sultan. The hatti sherifs are composed in the Turkish language. Above the text, as a token of the authenticity of the rescript, stands the intricate flourish or mark of the Sultan. This flourish is called *tugra*, or *rishani sherif*. The hatti sherif is irrevocable, while the written decrees of the Sultan relative to matters not so important, called Irads, are decisions or opinions of the ruler liable to be amended or abrogated.

HATTO, hät′tȯ. The name of two archbishops of Mainz. Hatto I (c.850–913) became abbot of Reichenau in 888 and Archbishop of Mainz three years later. He possessed great influence at the court of the Emperor Arnulf, and after the death of the latter in 899 became the guardian of his infant son, Louis the Child. In the struggle between the German kings and the anarchic feudal nobility Hatto was a zealous partisan of the monarchy, and brought to its aid a bold spirit, a crafty mind, and a conscience which balked neither at treachery nor murder. His haughty bearing and magnificent mode of life still further incensed the nobles, who hated him as the instrument of the royal power. The feeling with which he was regarded by the people as a whole is attested by the widespread legend that his body, after death, was carried off by the devil and flung into the crater of Mount Etna. Of greater authenticity is the story related of his perfidious conduct towards Count Adalbert of Babenberg, a noble of Thuringia, who had been at enmity with the Emperor, and who was induced by Hatto to seek the King's presence for the purpose of effecting a reconciliation, the Archbishop promising under oath to restore him unharmed to his castle. After the two had started on their journey from Adalbert's home, Hatto found some pretext for returning with his unsuspecting companion to the castle, thus fulfilling the letter of his vow. Setting out once more, they arrived at the royal camp, where Adalbert was put to death. Hatto is also the hero of the well-known legend connected with the Mouse Tower, situated on an island in the Rhine, near Bingen. During a famine, as the story goes, the Archbishop caused a number of poor people to be burned in a barn, comparing their cries of agony to the squealing of mice. He was thenceforward pursued by a plague of these animals, to escape which he built the tower on a rock in the Rhine. He could not, however, evade his persecutors and was finally devoured by them. This story, however, is told with slight variations of several historic characters, and is more frequently associated with his namesake, Hatto II, who was Archbishop of Mainz from 968 to 970. Consult Heidemann, *Hatto I., Erzbischof von Mainz* (Berlin, 1865), and Baring-Gould, *Curious Myths of the Middle Ages* (London, 1866–67).

HAT′TON, Sir Christopher (1540–91). An English statesman and jurist, born at Holdenby. He studied at St. Mary Hall, Oxford, became a member of the Inner Temple (1559), sat in Parliament from 1571 to 1587, and showed himself a bitter enemy of the Jesuits. Parry, who defended them in Commons, Hatton accused, and finally had him condemned to death. He was a commissioner at the trial of Babington, of the conspirators against Elizabeth, and of Mary Stuart, and in general showed himself a clever courtier of the Queen. In 1587 she made him Lord Chancellor—the "dancing Chancellor," as he was called, in allusion to the story that the Queen first looked on him with favor when she saw him dancing. In literary history Hatton is best known as the patron of Spenser, who dedicated to him *The Faerie Queene*. Consult Nicolas, *Memoirs of the Life and Times of Sir Christopher Hatton* (London, 1847).

HATTON, Frank (1846–94). An American journalist, born in Cambridge, Ohio. He learned the newspaper business in the office of his father, who edited the Cadiz (Ohio) *Republican*. He served through the Civil War, attaining the rank of first lieutenant, and then became a journalist in Iowa, finally becoming editor in chief of the Burlington *Hawkeye*. In 1881 he was appointed Assistant Postmaster-General and three years later succeeded Walter Q. Gresham as Postmaster-General, thereby becoming the youngest cabinet officer since Alexander Hamilton. In 1884–88 he was editor in chief of the *Mail* in Chicago and in 1888 returned to Washington, where he edited the *Post* until his death.

HATTON, Joseph (1841–1907). An English journalist, novelist, and playwright, born at Andover. He was educated at home and in Chesterfield and began his literary career by writing for the *Derbyshire Times*, a paper his father had founded. In 1868 he went to London to edit and transform the *Gentleman's Magazine* and was soon correspondent for German, Australian, and American papers, while he made frequent visits to the United States in the interests of English journals. His popular *Cigarette Papers* appeared first in the *People*, of which he became editor in 1900. His Eastern travels bore fruit in *The New Ceylon* (1881), and he brought out *Henry Irving's Impressions of America* (1884); but he is best known as the author of such novels as: *Under the Great Seal* (1893); *The Banishment of Jessop Blythe* (1895); *The Dagger and the Cross* (1897); *When Rogues Fall Out* (1899); *In Male Attire* (1900). His romance, *John Needham's Double*, was dramatized for E. S. Willard, and Richard Mansfield produced his version of *The Scarlet Letter*. Hatton also arranged *The Prince and Pauper* for his daughter Bessie, and *Jack Sheppard* for Weedon Grossmith.

HÄTZER, hĕts′ĕr, Ludwig (c.1500–29). A prominent Swiss Anabaptist. He was born at Bischofszell, near St. Gall, Switzerland, studied at Freiburg im Breisgau, and attained high rank as a scholar, particularly in Latin, Greek, and Hebrew. He was intimate with Zwingli, but, being a radical, he desired to move faster than Zwingli thought prudent. In the fall of 1524 he returned to Zurich and openly allied himself with the Anabaptist party. He published a German translation of Œcolampadius' book upon the sacraments; but his continued rejection of infant baptism alienated Zwingli from him, and in March, 1526, he was banished. He went to Basel, where he translated Malachi, with Œcolampadius' commentary (1526), and finally to Strassburg, where he finished, with Johann Denk, a translation of the Prophets (1527), which he published at Worms. He returned to Augsburg, only to be banished again (spring, 1528). He wandered to Constance, and, on the trumped-up charge of having seduced the servant of his wife, he was beheaded after three months' imprisonment, Feb. 4, 1529. So bitter was the feeling that his very name was sometimes spelled in an opprobrious manner, Hetzer, meaning 'irritator.'

HATZFELD, häts′fĕlt, or (Hungarian) **ZSOMBOLYA,** zhŏm′bŏ-lyŏ. A small town, in the County of Torontál, Hungary, 152 miles southeast of Budapest, in a very fertile district (Map: Austria-Hungary, G 4). Of chief interest is the château of Count Csekonics. Wheat, corn, and rape are raised, and horses are exported. Hatzfeld is the principal settlement of the Swabians of south Hungary, who recaptured the town from the Turks in 1718 and redeemed the district from swamps. Pop., 1900, 10,138; 1910, 10,822, mostly Catholic Germans.

HAUBERK, ha̧′bĕrk (from OF. *hauberc, halberc,* Fr. *haubert,* from MHG., OHG. *halsberc, halsberge,* AS. *halsbeor,* hauberk, from OHG., MHG., Goth. *hals,* Ger. *Hals,* AS. *heals,* neck; ultimately connected with Lat. *collum,* neck + OHG. *bergan,* MHG., Ger. *bergen,* Goth. *baírgan,* AS. *beorgan,* to protect). In mediæval armor a defense for the body consisting of a shirt made of steel. Originally the hauberk was only a protection for the neck and was made of thick leather. Later it was made of chain mail and at the end of the eleventh century was joined to the mail shirt, or byrnie (q.v.), the name being applied to the whole garment. In the twelfth century the sleeves of the hauberk sometimes terminated at the elbow, but in the thirteenth and fourteenth centuries these came down to the wrist and very generally descended over the hand in the form of a glove or mitten. In the fourteenth century the hauberk was sometimes worn under plate armor; in the fifteenth century it was gradually discarded entirely. Consult Ashdown, *Arms and Armour* (New York, 1909). See Armor.

HAUBOLD, hou′bōlt, Christian Gottlieb (1766–1824). A German jurist of the historical school, born at Dresden and educated at Leipzig, where he became professor of Roman law in 1789. He wrote: *Institutiones Juris Romani Literariæ* (1809); *Institutionum Juris Romani Privati Lineamenta* (last ed., by Otto, 1826); *Manuale Basilicorum* (1819); *Doctrinæ Pandectarum Lineamenta* (1820); and the excellent *Lehrbuch des sächsischen Privatrechts* (3d ed., by Hänsel, 1847–48).

HAUCH, houg, Johannes Carsten (1790–1872). A prolific Danish poet and dramatist. Born at Fredrikshald in Norway, of Danish parents, he came to Denmark (1803) when his mother died, and fought against the English in 1807. Having taken his doctorate at the University of Copenhagen in 1821, he traveled extensively from 1821 to 1827. Through association with Oehlenschläger, he became an apostle of literary reform. His early dramas are of little importance. Then in 1834 he turned to prose fiction, in which field he wrote: *Vilhelm Zabern* (1834), the most admired; *Guldmageren* (1836); *En polsk Familie* (1839); *Slottet ved Rhinen* (1845). In 1842 he published a collection of lyrics, some of which are among the best in Danish literature. In 1846 he was made professor of Scandinavian languages at Kiel, but returned to Copenhagen in 1848 and now wrote many good tragedies, such as: *Söstrene paa Kinnekullen* (1849); *Marsk Stig* (1850), the best; *Tycho Brahe's Ungdom* (1852); *Julian den Frafaldne* (1866). He wrote also an historic epic, *Valdemar Atterdag* (1862), and a second collection of poems (1861). He succeeded Oehlenschläger as professor of æsthetics at Copenhagen in 1851. Of strong imagination and with a bent for the mystic and supernatural, his work at its best is admirable, but its average is not high. Hauch's *Dramatic Works* appeared in three volumes (Copenhagen, 1852–59); his novels in seven (ib., 1873–75; new ed., 1903–05); and his poems have also been collected (ib., 1890–91). Consult Brandes, *Danske Digtere* (Copenhagen, 1877).

HAUCK, houk, Albert (1845–). A German Lutheran theologian, born at Wassertrüdingen in Middle Franconia. He studied at the universities of Erlangen and Berlin and in 1882 became a professor at Erlangen, where he remained until 1889, when he went to the University of Leipzig. In 1891 he was elected a member of the Royal Academy of Sciences. His writings include: *Tertullians Leben und Schriften* (1877); *Die Bischofswahlen unter den Merowingern* (1883); *Kirchengeschichte Deutschlands,* in six parts (parts i–iii, 1887–96; parts i–iv, 2d ed., 1898–1902). As a reward for these labors, he was given the great Verdun prize by the Prussian Academy of Sciences (1899). In 1881 he became an editor of the revised edition of the *Realencyklopädie für protestantische Theologie und Kirche* (3d ed., 1896), and after Herzog's death, in 1882, the sole editor. In 1902 he was given the degree of LL.D. by the University of Freiburg, where he was dean in 1904–05 and 1910–11.

HAUENSCHILD, hou′en-shĭlt, Richard Georg Spiller von (1825–55). A German poet and novelist, born in Breslau, better known under his pseudonym, "Max Waldau." He began the study of law in the university of his native city, but soon forsook it for modern languages, history, and philosophy. His poems include: *Blätter im Winde* (1848); the epics *Cordula. Graubündner Sage* (2d ed., 1855) and *Rahab* (1855); and the elegy, *O diese Zeit!* (1850). Of his novels *Nach der Natur* (2d ed., 1851) and *Aus der Junkerwelt* (1850) are most noteworthy.

HAUER, hou′ĕr, Franz von (1822–99). An Austrian geologist, born at Vienna and educated there and at Schemnitz. In 1846 he became an assistant of Haidinger at the Mineralogical Museum in Vienna, and from 1849 to 1867, as a member of the Imperial Geological Institute, and after 1866 as its director, took part in many geological surveys. In 1886 he was appointed superintendent of the Vienna Museum of Natural History and edited its *Annalen* (1886–96) and for the last seven years of his life was a member of the Austrian House of Lords. His published works include: *Geologische Uebersicht der Bergbaue der österreichischen Monarchie* (1855), with Foetterle; *Die Geologie und ihre Anwendung auf die Kenntnis der Bodenbeschaffenheit der österreichisch-ungarischen Monarchie* (2d ed., 1878); and a *Geologische Karte von Osterreich-Ungarn* (5th ed., 1896). Consult Böhmersheim, *Zur Erinnerung an Franz von Hauer* (Vienna, 1899).

HAUFF, houf, Wilhelm (1802–27). A German novelist, born at Stuttgart. His education was desultory and revealed no precocity; his effective training came from his mother and sisters and tended to cultivate the imagination rather than the intellect. He studied theology at Tübingen (1820–24) and in 1826 published his first volume, *Märchenalmanach*, followed by two sequels of like title, all marked by a singularly dramatic humor. Equally successful were the *Mitteilungen aus den Memoiren des Satans* (1826) and *Der Mann im Monde* (1826), the last under the name of H. Clauren, a lesser novelist, whose sentimentality it was intended to parody. This it did so successfully as to deceive Clauren's most enthusiastic admirers. His *Lichtenstein* (1826) is one of the best historical novels in German literature. It is a series of vivid historical pictures of men and manners and has held its popularity for three generations. Hauff traveled in Germany, France, and Belgium, and became editor of the Stuttgart *Morgenblatt*. The summer of 1827 he passed in the Tirol, still at work; but in September his health began to fail, and in October he died. To 1827 belong the *Phantasien im Bremer Ratskeller, Das Bild des Kaisers,* and *Die Bettlerin vom Pont des Arts.* Among the other collected *Tales* the best are *Das Wirtshaus im Spessart, Othello, Jud Süss,* and *Die Sängerin.* Hauff's works are still often reprinted and enjoy undiminished popularity. For biography, consult H. Hofman (Frankfort, 1902).

HAUFFE, Frederike. See Prevorst, Seeress of.

HAUG, houg, Johann Christoph Friedrich (1761–1829). A German poet, known also by his pen name "Hophthalmos," born at Niederstolzingen (Württemberg). He studied in Stuttgart at the Karlschule, or military institute of Duke Karl Eugen, where he was one of the Schiller group; in 1783 was appointed a secretary to the Ducal Board of Privy Councilors, in 1794 private secretary, and in 1816 librarian, of the Royal Public Library at Stuttgart, with the title of Aulic Councilor. Ready in improvisation, he wrote quantities of neat but rather commonplace verse for literary almanacs, anthologies, and journals, and for Cotta's *Morgenblatt,* of which he was an editor from 1807 to 1817. As an epigrammatist, however, he was perhaps second only to Logau (q.v.). The most representative exercise of his wit is to be found in his *Zweihundert Hyperbeln auf Herrn Wahls ungeheure Nase* (1804; 3d ed., 1850), a *tema con variazioni,* which certainly to unprejudiced minds attests his mobility and resourcefulness. A selection from his *Gedichte* appeared at Stuttgart in 1840; another forms No. 1136 of Reclam's *Universalbibliothek.* Consult Fischer, *Beiträge zur Litteraturgeschichte Schwabens* (Tübingen, 1901).

HAUG, Martin (1827–76). A German Orientalist, born at Ostdorf in Württemberg. Overcoming every obstacle to his early education, he became a school-teacher, first at Ostdorf and later at Unternsingen. Here he was forced to continue his classical and Hebrew studies in secret; but he persevered, and developed a taste in linguistics and Sanskrit. Haug entered the Gymnasium at Stuttgart in 1848 and in 1852 received the degree of Ph.D. at Tübingen. Until 1859 his work was mainly at Bonn and Heidelberg, but in that year he was appointed superintendent of Sanskrit studies at the Government College at Poona, India. Leaving Europe with his bride, he went to India, where he worked unceasingly in Sanskrit, Avestan, and Pahlavi, in addition to the task of reforming the system of native education. In 1866 Haug returned to Germany, and two years later was appointed to the newly created chair of Sanskrit and comparative linguistics at Munich, which he held until his death. Haug's work was of signal importance for Indo-Iranian studies in the Orient. He was the first to recognize the importance of the traditional interpretation of the texts as contrasted with the linguistic or comparative school; and his books, though comparatively few in number, are still, for the most part, of value. His chief contributions were: *Die fünf Gâthâs* (2 vols., 1858–62); *The Aitareya Brāhmana of the Rigveda* (2 vols., 1863), his best work in Indian literature; *An Old Zend-Pahlavi and Pahlavi-Pazand Glossary* (2 vols., 1867–70), in collaboration with Hoshengji Jamaspji; *Ueber den Character der Pehlewi Sprache* (1869); *Introductory Essay on the Pahlavi Language* (1870); *The Book of Arda Viraf* (2 vols., 1872–74), in collaboration with E. W. West; *Essays on the Parsis* (3d ed., 1884). Consult Evans, in West's edition of the essays, and Bezzenberger, *Beiträge zur Kunde der indogermanischen Sprachen,* vol. i (Göttingen, 1876).

HAUG, Robert (1857–). A German battle painter, born in Stuttgart. His studies were begun at the Art School of Stuttgart and continued at Munich in the academy. At the Munich International Exposition of 1888 he attracted very favorable notice by his two works, "The Prussians near Möckern" (Stuttgart Museum) and "Volunteer Riflemen of 1813" (National Gallery, Berlin), the latter of which also obtained the gold medal at the Berlin Exposition in 1891. He became an instructor in the Stuttgart Art School in 1894. His further works, for the most part scenes from the War of Liberation, characterized particularly by atmospheric effects, include: "The Farewell" (Munich Pinakothek); "At Dawn" (1891, Dresden Gallery); "The Approach of Blücher's Army to the Rhine" (1893), "Fight in the Streets of Leipzig, October, 1813" (1895, Leipzig Museum); "The Castle Guard" and "Battle in a Cornfield" (National Gallery, Berlin). To a sound naturalistic technique he unites a narrative talent of a high order.

HAUGHTON, hạ'ton, Samuel (1821–97). An Irish scientist, born at Carlow, Ireland. He graduated (B.A., 1844; M.A., 1852; M.D., 1862) from Dublin University. From 1851 to 1881 he held the professorship of geology there, and he was also medical registrar. He was elected a fellow of the Royal Society in 1858, served as university representative from 1878 to 1896 on the General Medical Council, was president of the Royal Irish Academy in 1886–91, and in 1883 became president of the Royal Zoölogical Society of Ireland. Besides numerous scientific papers, he is author of *Manual of Elementary Mathematics* (1851), with Joseph Galbraith; *Manual of Geology* (1865); *Principles of Animal Mechanics* (1873); *Six Lectures on Physical Geography* (1880).

HAUGIANS, hou′gĭ-*a*nz. A religious body in Norway, the followers of Hans Nielsen Hauge (1771–1824). He was a peasant, and became an enthusiastic revival preacher early in the nineteenth century, so annoying to the regular clergy that they procured his punishment by fine and imprisonment. He held that the ministry is a common duty, and that ordination for the service is not necessary; that Church creeds and confessions are of small account, but faith and works are everything; and he laid much stress upon strict discipline. He gained many followers, particularly from the lower classes, and his work was continued after his death. For the life of Hauge, consult Bang (Christiania, 1875). His name is commemorated in Hauge's Synod, one of the independent Lutheran bodies of the United States. The synod was organized in 1846–50 by immigrants from Norway. Its main strength is in the States of Minnesota, South Dakota, and Wisconsin.

HAUGWITZ, houg′vĭts, Christian Heinrich Karl, Count (1752–1831). A Prussian statesman, born near Oels in Silesia, and educated in law at Halle and Göttingen. His mystical philosophy won him the favor of Frederick William II, who sent him to Vienna as Ambassador, and in 1792 appointed him Minister of Foreign Affairs at Berlin. During his administration the second partition of Poland took place (1793), and the humiliating Peace of Basel was signed (1795). When the French occupied Hanover in 1803, Haugwitz resigned; but two years later, when the French troops had entered Ansbach, he was sent to treat with Napoleon, and after Austerlitz signed the treaty ceding Ansbach, Cleves, and Neuchâtel to the French and giving Hanover to Prussia. Received by Napoleon when the latter was characteristically in a rage, he was forced to cede about twice as much territory as his instructions authorized. Soon after he replaced Hardenberg as Prime Minister, but was unable to better the relations with France, and after Jena retired to his estates in Silesia and Poland. Consult Minutoli, *Der Graf von Haugwitz und Job von Witzleben* (Berlin, 1844).

HAUK, Minnie (1852–1912). An American dramatic soprano. She was born in New York, of German parentage, and studied both at home and in Europe. Her first appearance was on the concert platform in New Orleans (1865), and three years later she made her operatic début in New York City. The same year she appeared in Italian opera in London with great success. The following year she was engaged as the prima donna of the Vienna Court Opera and from 1873 to 1875 was employed in a like capacity at Berlin. She also sang with marked success in every capital of the civilized world. Her repertoire included about 100 rôles. In 1881 she married Ernst von Hesse-Wartegg (q.v.). She retired from the stage in 1896.

HAUKSBEE, ha̤ks′bē̇, Francis, the Elder (?–c.1712). An English physicist, admitted to the Royal Society of London in 1705, and who made a number of brilliant discoveries. Little is known of his life save through his scientific papers which were published in the *Philosophical Transactions*, and a volume on *Physico-Mechanical Experiments on Various Subjects, Containing an Account of Several Surprising Phenomena Touching Light and Electricity Producible on the Attraction of Bodies.* He discovered that light could be produced by mercury shaken in a glass tube, and that this effect was increased when the action took place in a vacuum. Hauksbee devised one of the first electrical machines and also made improvements in the air pump. He is supposed to have died in 1712, his last papers in the *Philosophical Transactions* appearing posthumously in 1713. He is mentioned by Newton in certain letters.

HAUKSBEE, Francis, the Younger (1687–1763). An English optician, possibly a son of the foregoing. He was for 40 years previous to his death clerk and housekeeper of the Royal Society, London. He was somewhat of a scientist, being an instrument maker and optician, and is said to have been the first to deliver scientific lectures with experiments in London. "A Course of Mechanical, Optical, and Pneumatical Experiments" was given by Hauksbee, who performed the experiments while the explanatory lecture was delivered by William Whiston, M.A. The syllabus of this course of lectures, as well as those of astronomy and chemistry, is interesting as showing the state of experimental science at that time.

HAULIK DE VÁRALJA, hou′lĭk dȧ vä′rŏl-yŏ, Georg (1787–1869). A cardinal and Archbishop of Agram, born at Tyrnau in Hungary. He was a strong defender of the unity of Austria, and a very determined adversary of Kossuth, who in 1849 proscribed him as a traitor. His *Selectiones Encyclicæ Literæ et Dictiones Sacræ* (1850–53), a collection of pastoral letters, is of value to historical study.

HAULLEVILLE, ō̇l′vē̇l′, Prosper Charles Alexandre, Baron d' (1830–98). A Belgian publicist, born in Luxemburg, of a French immigrant family from Lorraine. He studied law at Liége, Brussels, and Bonn, and then entered Belgian politics as a member of the Constitutional-Catholic party. He was editor at various times of *L'Universel*, the *Revue Générale*, and the *Journal de Bruxelles*. His books include: *Histoire des communes lombardes depuis leur origine jusqu'à la fin du XIIIème siècle* (1858); *La définition du droit* (1875); and *De l'avenir des peuples catholiques* (1876), the last of which was translated into nine languages and procured him the position of papal chamberlain.

HAUL′TAIN, Frederick William Gordon (1857–). A Canadian statesman and jurist. He was born at Woolwich, England, went to Canada in his youth and was educated at Peterboro Collegiate Institute and Toronto University, and was called to the Ontario bar in 1882. In 1884 he went to the Northwest Territories and for some time was crown prosecutor at Fort Macleod (later included in the Province of Alberta). He was a member of the Advisory Council of the Northwest Territories (1888–97), at the same time a Conservative member of the Northwest Territorial Legislature, and during 1897–1905 Premier, also Attorney-General and Commissioner of Education. In 1896 he was elected a vice president of the Canadian Bar Association. After the organization of Saskatchewan, in 1905, Haultain became the leader of the Conservative party in that Province. In

1913 he was appointed Chief Justice of Saskatchewan.

HAULTAIN, Theodore Arnold (1857–). A Canadian essayist. He was born at Cannanore, India, but went to Canada in his youth and was educated at Toronto University. He afterward studied medicine, but left it for journalism and literature. For some time he was editor of the *Educational Weekly* (Toronto). In 1889–93 he was one of the librarians of the Public Library, Toronto, and later was private secretary to Goldwin Smith (q.v.), until the latter's death in 1910. He was a frequent contributor to leading magazines and reviews in Great Britain and the United States. He published: *A Critique of Cardinal Newman's Exposition of the Illative Sense; A Fragmentary Dialogue on Love and Religion; Who Should Emigrate?; Two Country Walks in Canada; The Mystery of Golf* (1908); *Hints for Lovers* (1909); *England's Plight; A Returned Exile's Impressions; Memoirs of Goldwin Smith* (1911); *Goldwin Smith: His Life and Opinions* (1913).

HAUNTED MAN, The. A Christmas story by Charles Dickens (1847).

HAUPT, houpt, Erich (1841–1910). A German Protestant theologian, born at Stralsund and educated at Berlin. He taught in Gymnasia in Kolberg and Treptow from 1861 to 1878 and was professor of New Testament exegesis successively at Kiel (1878), Greifswald (1883), and Halle (1888). He wrote *Der erste Brief des Johannes* (1869); *Die alttestamentlichen Citate in den vier Evangelien* (1871); *Die Kirche und die theologische Lehrfreiheit* (1881); *Plus ultra, zur Universitätsfrage* (2d ed., 1890); *Die Bedeutung der heiligen Schrift für den evangelischen Christen* (1891); *Zum Verständnis des Apostolats im Neuen Testament* (1896); two volumes of sermons (1890–1905); etc.

HAUPT, Herman (1817–1905). An American engineer, born in Philadelphia, Pa. He graduated at West Point in 1855, but in the same year resigned a commission in the Second Infantry to become an assistant engineer on the public works of Pennsylvania. In 1844 he became professor of civil engineering and mathematics in Pennyslvania College, but three years later he resumed the practice of his profession, as principal consulting engineer of the Philadelphia Railroad, of which he became successively the general superintendent and chief engineer. He was chief engineer of the Hoosac Tunnel from 1856 to 1861. In the Civil War he was chief of the United States Bureau of Military Railroads and served on the staff of General McDowell with the rank of colonel. From 1872 to 1876 he was general manager of the Piedmont Air-Line Railroad, from 1876 to 1878 was chief engineer of the Pennsylvania Transportation Company and Seaboard Pipe-Line, from 1881 to 1885 was general manager, and 1885 to 1886 was general superintendent of the Northern Pacific Railroad. He invented a drilling machine that won the highest prize of the Royal Polytechnic Society of Great Britain and was the first to prove the practicability of transporting oil in pipes. He wrote: *Hints on Bridge Building* (1840); *General Theory of Bridge Construction* (1852; new ed., 1879); *A Consideration of the Plans Proposed for the Improvement of the Ohio River* (1855); *Military Bridges* (1864). Consult his *Reminiscences* (1902).

HAUPT, Lewis Muhlenberg (1844–). An American civil engineer, born in Gettysburg, Pa. He was educated at Harvard and at West Point, became lieutenant of lake surveyors by 1868, and in the following year was attached to a military district in Texas. From 1872 to 1892 he was professor of civil engineering in the University of Pennsylvania and in 1885–86 was editor of the *Engineering Register.* In 1886 he invented a method for marking channels. He was a member of the Nicaraguan and the Isthmian Canal commissions (1897–99), was president of the Colombia-Canea Arbitration (1897), was chief engineer of the survey for ship canals across New Jersey, and was consulting engineer on the construction of the Ohio-Lake Erie ship canal. In addition to his numerous contributions to engineering journals his publications include: *Working Drawings and how to Make and Use them* (1881); *The Topographer: His Methods and Instruments* (1884); *Physical Phenomena of Harbor Entrances* (1887); *Canals and their Economic Relation to Transportation* (1890); *A Move for Better Roads* (1891); *The Mississippi River Problem* (1904); *Transportation in the United States* (1907).

HAUPT, Moritz (1808–74). A well-known German philologist. He was born at Zittau and studied from 1826 to 1830 at Leipzig, where in 1841 he was appointed professor of the German language and literature. For having participated in the agitation of 1848–49, in support of the maintenance of the Imperial constitution, he was deprived of his professorship. In 1853, however, he was called to Berlin to succeed Lachmann as professor of classical literature. In 1861 he became perpetual secretary of the Academy of Sciences. By his painstaking and scholarly critical work he rendered distinguished service to both classical and German philology, chiefly as an editor of texts. In the former field he published: *Quæstiones Catullianæ* (1857); *Observationes Criticæ* (1841); editions of Horace (4th ed., 1881), Catullus, Tibullus, Propertius (5th ed., 1885), Vergil (2d ed., 1873), and other classical writers. As his chief contributions to German philology, he edited Hartmann von Aue's *Erec* (1839), *Lieder und Büchlein,* and *Der arme Heinrich* (1842); Rudolph von Ems's *Der gute Gerhard* (1840); the poems of Gottfried von Neifen (1851); and the *Moritz von Vraon* (1858) and *Von dem übeln Weibe* (1871) of Neidhard von Reuenthal, and, above all, Konrad von Würzburg's *Engelhard* (1844; new ed., 1890). He also edited Æschylus from the papers of Hermann (2d ed., 1858), and completed Lachmann's edition of the Mediæval German lyrics of the Minnesingers (*Des Minnesangs Frühlung,* 4th ed., 1888). In 1836, with Hoffmann von Fallersleben, he founded the *Altdeutsche Blätter,* succeeded in 1841 by the *Zeitschrift für deutsches Altertum,* which he edited until his death. His numerous briefer contributions are collected in his *Opuscula* (3 vols., 1875–76); and his *Französische Volkslieder* appeared posthumously in 1877. Consult: Belger, *Moritz Haupt als akademischer Lehrer* (Berlin, 1879); Nettleship's lecture (Oxford, 1879), later incorporated in his *Lectures and Essays, First Series* (Oxford, 1885); Sandys, *A History of Classical Scholarship,* vol. iii (Cambridge, 1908).

HAUPT, Paul (1858–). A Semitic scholar, one of the pioneers of Assyriology in America. He was born at Görlitz, Germany, Nov. 25, 1858. He studied at the universities of Berlin and Leipzig. In 1880 he became privatdocent in the University of Göttingen and from 1883 to 1889 was assistant professor of Assyriology. In 1883 he became professor of Semitic languages at Johns Hopkins University, but until 1889 continued to lecture in the summer at Göttingen. Besides numerous smaller articles, he projected and edited the *Polychrome Bible*, a critical edition of the Hebrew text of the Old Testament, and a new English translation with notes. A unique feature of this edition is the use of different colors to distinguish the various sources and component parts in the Old Testament books—each one of which is intrusted to a specialist in biblical studies. Among his Assyriological publications may be mentioned his edition of the *Nimrodepos* (the Gilgamesh epic, 1884–91); *Akkadische und sumerische Keilschrifttexte* (1881–82); *Die akkadische Sprache* (1882); *Sumerische Familiengesetze* (1883). He also became in 1881 coeditor with Friedrich Delitzsch of the *Beiträge zur Assyriologie und semitischen Sprachwissenschaft*, published in Leipzig. He published critical texts with notes of *Canticles* (1902); *Koheleth* (1905); *Ecclesiastes* (1905); *Nahum* (1907); *Esther* (1908); *Micah* (1910); *Biblische Liebeslieder* (1907); "Die Schlacht von Taanach," in *Studien . . . Wellhausen gewidmet* (1914).

HAUPTMANN, Anna P. Milder-. See Milder-Hauptmann.

HAUPTMANN, houpt′mȧn, Gerhart (1862–). One of the greatest of modern German dramatists. He was born in Salzbrunn, son of a hotel keeper and grandson of a weaver. After some years of schooling he worked for a time on a farm. In 1880 he entered the art school in Breslau to become a sculptor, unable yet, however, to decide between this art and poetry. He then went to Jena, where his brother Carl was studying, and heard the lectures of Ernst Haeckel. In 1883 he sailed from Hamburg to Genoa, whence he visited Naples, Capri, and Rome. Here he set up a studio and tried sculpture again. His success was not great. Illness drove him home to Germany, where in 1885 he married Marie Thienemann, a lady of wealth. Then came two semesters of study at the University of Berlin. His interest in natural sciences and sociology continued. In 1888 he removed to a country house in Erkner. In 1889 he wrote his drama *Vor Sonnenaufgang*, which Otto Brahm produced in the Free Theatre. He owed, at the beginning of his career, much also to the publisher Fischer and to Paul Schlenther, later director of the Burgtheater in Vienna. His first work, *Promethidenlos* (1885), was an epic. His dramas, *Vor Sonnenaufgang* (1889), *Das Friedensfest* (1890), *Einsame Menschen* (1891), and *Die Weber* (1892), show the influence of Zola, Ibsen, and Tolstoy, a spirit of revolt against the social conditions and the artistic ideals of a military and capitalistic state. Thus the young Hauptmann, with the young Sudermann, was for a time leader of a second Young German movement, and the production of *Vor Sonnenaufgang* at the Free Theatre of Berlin was the signal for a contest, recalling in a way that over the *Cid* or *Hernani.* The quiet and retiring poet became at once a notoriety. These dramas were aggressively democratic, social, realistic. His actors are no longer persons or characters, they are described as "people in action," who walk, talk, and act as in everyday life, or at least seem to do so, by an art that hides art. And it is everyday life of which they speak, the sordid social struggles of to-day in which they are engaged, the vulgar vices that hold them in a gloomy, brutal grasp. This naturalism is as pessimistic as that of Zola. *Die Weber* constantly suggests *Germinal*, but the poet and the artist in Hauptmann here rises above the theorist and the philosopher. In 1892 he published two novelistic studies, *Der Apostel* and *Bahnwärter Thiel*, neither successful.

Up to 1892 Hauptmann might have seemed morbidly ethical in tragedy. He was now to show himself in *Kollege Crampton* (1892) and *Der Biberpelz* (1893) capable of painting delightful pastels of humorous character, though it is here with a professional thief and there with a drunkard that we have to do. And presently in *Hanneles Himmelfahrt* (1894) he appears in still another character as an extreme idealist, dealing no longer with vice, hunger, and mental decay, but with dreams, fantasies, and faith. *Hannele* is a mystic poem. So is *Florian Geyer* (1895), a stage failure; and *Die versunkene Glocke* (1897; trans. by Meltzer, 1900) calls itself a "fairy drama." Then may be noted in *Fuhrmann Henschel* (1898) a turn from mysticism to an idealized realism in a situation suggesting that of Balzac's *La rabouilleuse*, though its fundamental naturalism is tempered by a spiritual restraint that comes from a great poet's moral intuition. Here Hauptmann has touched earth again as the poet of social altruism, giving to the German working class an artistic expression of their own weakness. *Schluck und Jau* (1900), a farce, is a romantic adaptation of an Arabian tale; and his next drama, *Michael Kramer* (1900), while abounding in lines of sententious eloquence, is sordid in subject, and proved on the stage a melancholy failure. *Der arme Heinrich* (1902) showed little dramatic strength, but *Rose Bernd* (1903) is powerful in its realistic portrayal of a woman's downfall. It was followed by *Elga*, written in 1896, a dream tragedy; *Die Jungfern von Bischofsberg* (1905), a comedy; and the Silesian drama *Und Pippa tanzt* (1906), where symbolism is carried to an extreme and all meaning is lost in a complexity of passions and motives. Then followed the historical drama *Kaiser Karls Geisel* (1908); the entertaining book of travel *Griechischer Frühling* (1908); *Griselda* (1909), an historical drama; *Der Narr in Christo Emanuel Quint* (1910), a powerful novel; the tragi-comedy *Die Ratten* (1911); the tragedy *Gabriel Schillings Flucht* (1911); the novel *Atlantis* (1912); and *Festspiel für Breslau* (1913). Many of Hauptmann's writings have been translated into English, French, and other languages. An authorized edition of his *Dramatic Works*, edited by Ludwig Lewisohn, appeared in New York (1912 et seq.). In 1896 and in 1899 he won the Grillparzer prize, in 1912 the Nobel prize for literature, and in 1905 Oxford University conferred a doctor's degree upon him. With his second wife, Margarete Marschalk, he made his home in Magnetendorf in the Giant Mountains, Silesia. Consult for biography: Paul Schlenther (Berlin, 1898); A. Barthels (2d ed., ib., 1906); U. C. Werner (Munich, 1900); for literary estimates: B. Litzmann, *Das deutsche Drama in den litterarischen Bewegungen der Gegenwart* (4th ed., Hamburg, 1898); E. Steiger, *Das Werden des neuen Dramas* (Berlin, 1898); Leo Berg, *Der Ueber-*

mensch in der modernen Litteratur (Munich, 1893); id., *Neue Essais* (Oldenburg, 1902); W. Bölsche, *Hinter der Weltstadt* (Leipzig, 1901); G. Brandes, *Menschen und Werke* (3d ed., Frankfort, 1900); H. Bulthaupt, *Dramaturgie des Schauspiels*, vol. iv (3d ed., Oldenburg, 1902); J. E. von Grotthus, *Probleme und Charakterköpfe* (Stuttgart, 1898); F. Servaes, *Praeludien* (Berlin, 1899); Kuno Francke, *German Ideals of To-Day* (Boston, 1907); E. E. Hale, Jr., *Dramatists of To-Day* (6th ed., New York, 1911); G. H. Röhr, *Gerhart Hauptmanns dramatisches Schaffen* (Dresden, 1912); K. Holl, *Gerhart Hauptmann: His Life and his Work* (Chicago, 1914).

HAUPTMANN, Moritz (1792–1868). A German composer and eminent writer on the theory of music, born at Leipzig. He was educated as a musician and studied the violin and composition under Spohr. His opera, *Mathilde* (1826), was very successful, but it was not until 1842, when he became cantor and musical director at the Thomasschule in Leipzig, that his genius as a teacher was universally acknowledged. His pupils, among whom were F. David, Kiel, Joachim, Sullivan, Von Bülow, and Cowen, cherished an enthusiastic admiration for him, and at his death Leipzig was in mourning. Of his compositions, all of which are marked by purity and beauty of style, the best are his motets. He embodied the result of many years' labors in his *Die Natur der Harmonik und Metrik* (1853; 2d ed., 1873; Eng. trans., 1888), which was a work of paramount importance and the foundation of modern musical theory.

HAURAKI (hou-rä′kė) **GULF.** An inlet on the east coast of North Island, New Zealand, 70 miles long and 40 miles broad (Map: New Zealand, N., B 3). The Great Barrier Island forms a natural breakwater at its entrance, and it contains numerous picturesque islands and good harbors. Auckland, considered to have the best harbor in New Zealand, and Thames are the chief towns on its shores.

HAURAN, hou-rän′ (Ar. *el-Hauran*, Gk. *Αὐρανῖτις*, *Auranitis*). A district of Syria, east of the Jordan (Map: Palestine, E 2). In a wider sense the name is used to designate the Turkish province including Hauran proper, Jedur, Jaulan, and part of the hill country south of the Yarmuk. Whether the Hauran mentioned by Asurbanipal (668–625 B.C.), on the Rassam cylinder (vii, 111), was intended as a designation of this larger territory cannot be determined. But in Ezek. xlvii. 16–18, Jaulan is clearly included in the description. In a narrower sense Hauran extends east of Jaulan to the desert and from the District of Damascus to the Yarmuk. This tract of land includes: (1) el Nukra, 'the cavity'; (2) el Leja, 'the refuge'; and (3) el Jebel, 'the mountains.' El Nukra is a hollow east of Jaulan, south of el Leja, and west of Jebel el Druze, 1500 to 2000 feet above sea level, with an exceedingly rich soil, formed by decomposed volcanic matter. El Leja is composed entirely of lava found in great masses and in fantastic shapes, with little vegetation. El Jebel is the high mountain region, with the lofty peaks of el Kuleib and the fortress of Salkhad. The country is watered by a number of streams that flow into the Yarmuk (Sheriet el Menadireh). The oldest monument is probably the so-called Job stone at Sheikh Saad, which is now known to have been erected by Rameses II (1310–1244 B.C.). The underground dwellings are no doubt much older. None of the cities of which ruins now exist can be regarded as older than the Græco-Roman period; but there may have been older cities on the same sites. There are at least 300 deserted towns in Hauran very solidly built and testifying to the flourishing condition of this region in earlier times. Great houses, built entirely of basalt, have been perfectly preserved and arouse the amazement of travelers. Numerous Greek inscriptions have been found, both Christian and pagan. Expeditions sent out by Princeton University undertook a systematic exploration of Hauran in 1899–1900, 1904–05, and 1909; and their observations on the geography and architecture, as well as numerous Greek, Latin, and Semitic inscriptions, have been published. The country has in recent times been inhabited by the Druses (q.v.). A railroad extends from Damascus to Muzerib. Consult: Wetzstein, *Reisebericht über Hauran und die Trachonen* (Berlin, 1860); Rey, *Voyage dans le Hauran* (Paris, 1861); Porter, *The Giant Cities of Bashan* (London, 1865); id., *Travels in Damascus and Hauran* (ib., 1870); Burton and Drake, *Unexplored Syria* (London, 1872); Schumacher, *Across the Jordan* (London, 1883); Merrill, *East of the Jordan* (New York, 1883); G. A. Smith, *Historical Geography of the Holy Land* (London, 1895); Ewing, *A Journey in the Hauran* (ib., 1895); Dusseau and Macler, *Voyage archéologique au Safa et dans le Djebal ed-Druze* (Paris, 1901); Bell, *The Desert and the Sown* (London, 1907); *Publications of an American Archæological Expedition to Syria, 1899–1900* (Leyden, 1904–08); *Princeton University Publications of Archæological Expeditions to Syria, 1904–1905 and 1909* (ib., 1908–13).

HAURANNE. See Duvergier.

HAURÉAU, ō̇′rȧ′ō̇′, Jean Barthélemy (1812–96). A French historian and politician, born in Paris. He was educated in the colleges of Louis le Grand and Bourbon and became a revolutionary writer on the staff of several metropolitan newspapers before he went to edit the *Courrier de la Sarthe* (1838–45) in Le Mans, where he also became city librarian. Thence he returned to the *National* in Paris, and after the revolution of 1848 he was made keeper of the manuscripts in the National Library, retaining the position until the coup d'état of Dec. 2, 1852. He was sent by the Department of Sarthe to the Constituent Assembly, after the dissolution of which he abandoned politics. He was made librarian of the Ordre des Avocats in 1861 and director of the National Printing Office in 1870, but retired in 1882. He was Commander of the Legion of Honor from 1878. He wrote: *François I et sa cour* (1853); *Charlemagne et sa cour* (1854); *Gallia Christiana* (1856–65); *Histoire de la philosophie scholastique* (1872–80), his best-known work.

HAU′RIENT (from Lat. *hauriens*, pres. p. of *haurire*, to draw water). A term in heraldry (q.v.), applied to a fish placed upright per pale.

HAUSA (hou′sȧ) **STATES,** or **HAUSA LAND.** A term of ethnographical rather than geographical significance. It now designates that part of Nigeria (q.v.) which lies north of the Benue and Niger rivers. It embraces the kingdoms of Sokoto (q.v.) and Nupe. The former includes the subsultanate of Gando, and the Kalam, Muri, Bautchi, and Jauri territories, and the Adamawa Empire. Bornu borders on the east, and the Niger from Lokodja to Birni borders on the west. The total area is estimated at 150,000 square miles, with about 4,000,000 inhabitants. The Hausa people are negroes with much admixture of other races—Tuareg, Berber, Fulah, etc. Their cranial index, or ratio of head width to head length, is 77.3. They are said to be intelligent, industrious, and hospitable, and are one of the most civilized races of Central Africa. They engage in agriculture, cattle raising, and commerce, and make good artisans. They form a large part of the military forces of Great Britain in Nigeria and also of Belgian Congo. For the most part they have adopted Mohammedanism from their conquerors, the Fulahs. The Hausa language has become that of trade over a large region to the westward and northward to the Barbary states. It represents an isolated branch of the Hamitic family of languages. An association for its study was formed in London in 1892, and a professorship has been established at Cambridge. Another race found in the region is the Tuculör. The Hausa Empire is supposed to have been very powerful about the middle of the fifteenth century. It gradually became divided up into states, some of which represented the highest civilization of the Sudan. The Fulahs entered the country gradually and in the early part of the nineteenth century made themselves masters of the whole region. Consult: Robinson, *Hausaland* (London, 1896); *Hausa Literature* (Cambridge, 1896); *Hausa Grammar* (London, 1897); Robinson and Brooks, *Hausa Dictionary* (Cambridge, 1899–1900); Rottray, *Hausa Folk-Lore, Customs, Proverbs* (2 vols., Oxford, 1913). There are also grammars by Schoen (London, 1862) and Marre (Vienna, 1901); a sketch summarizing the reasons for regarding Hausa as a Hamitic tongue is given in Meinhof, *Die Sprachen der Hamiten* (Hamburg, 1912).

HAUSEGGER, hou′zĕg-ĕr, FRIEDRICH VON (1837–99). An Austrian writer on musical theory, born at Vienna. He studied music with Salzmann and Otto Dessoff and, after practicing law for some time at Graz, became in 1872 a teacher of music at the university there. His most important book is *Musik als Ausdruck* (1885); and *Richard Wagner und Schopenhauer* (1892) and *Vom Jenseits des Künstlers* (1893) are also valuable.

HAUSEGGER, SIEGMUND VON (1872–). An Austrian composer and conductor, born at Graz. While attending the Gymnasium and university, he received at the same time thorough musical instruction from his father (see HAUSEGGER, FRIEDRICH VON), Degner, and Pohlig. In 1895–96 he was conductor at the Graz Opera, in 1897 assistant conductor at Bayreuth. He became more widely known when he directed with marked ability the famous "Kaim Konzerte" in Munich from 1899 to 1903. For the next three years he was conductor of the "Museum Konzerte" in Frankfort. He composed (on his own text) the operas *Zinnober* (1898), *Helfried* (1903); the symphonic poems *Dionysische Fantasie, Barbarossa, Wieland der Schmied;* a grand mass, and several very impressive male choruses with orchestra.

HAUSEN, hou′zen, MAX, BARON VON (1846–). A German soldier and administrator, born in Dresden, son of a lieutenant general. He entered the army when he was a mere boy, was a second lieutenant at the age of 18, and served in the war with Austria in 1866 and in the Franco-German War. In 1871–74 he was at the Berlin Military Academy, in 1875–87 and 1892–97 on the general staff, in 1900 commanding general of the Twelfth Army Corps, in 1901 general of infantry, in 1902 Minister of War for Saxony and representative of the kingdom in the Bundesrat, in 1910 "generaloberst," and in 1912 head of the Saxon Ministry. In 1914 he was put in command of the Saxon army of the centre, but in October of that year he was replaced by General von Einen. See WAR IN EUROPE.

HAUSER, houz′ĕr, FRANZ (1794–1870). A Bohemian opera singer, born at Prague. He was a pupil of Tomaschek and had a remarkable barytone voice. From 1817 to 1837 he sang with great success in Prague, Dresden, Vienna, London, Berlin, etc., and from 1846 to 1864 was director and singing teacher at the Munich Conservatory. He had a splendid collection of Bach's works, and his correspondence with Hauptmann and Mendelssohn is interesting. He died at Freiburg, Baden.

HAUSER, KASPAR. A German youth whose mysterious history attracted the attention of Europe during the nineteenth century. On May 26, 1828, a shoemaker of Nuremberg discovered the youth, evidently helpless, in the market place. He was dressed in peasant's clothing and appeared to be about 16 years of age. When questioned, he merely uttered a few incoherent words to the effect that he wanted to be a cavalry officer. He had upon him, however, a letter addressed to an officer who resided in the neighborhood. The letter, which purported to be written by a Bavarian laborer, stated that on Oct. 7, 1812, the bearer had been left by his mother, whose name was unknown, at the writer's door; that the lad had been taught to read and write; and that he now wished to enter the army and to serve in his father's regiment. Inclosed was a note, supposed to have been written by the mother, which declared that the foundling's name was Kaspar; that he was born April 30, 1812; and that she, the mother, a poor girl, was unable to care for him. The first letter was written in German, the second in Roman characters; but the hand was the same, and there was evidence of an intent to mislead. The Nuremberg authorities, at a loss to know what to do with the boy, sent him first to prison, where he was visited by crowds of curious persons, and later placed him under the care of a schoolmaster. He now developed very rapidly; for though at first he appeared to have the intelligence of a normal child of two or three years, within a twelvemonth he wrote a brief account of his life, and in the following year (1829) a longer biography, both of which were published. A new mystery was added on Oct. 17, 1829, when Kaspar was found bleeding severely from a wound in the forehead. His story was that he had been attacked by "the man," presumably the man who had originally brought him to Nuremberg. The circumstance created a sensation in the town, but no trace of the assailant was discovered. In 1831 the youth attracted the attention and sympathies of the Earl of Stanhope, who adopted him and sent him under the care of a teacher to Ansbach. This date, however, marks the turning point in his career. Not only did he make no further progress, but signs of deterioration appeared. Whether his head was turned by vanity, resulting from the extraordinary interest taken in him by persons of all classes, or whether he had reached the limits of his powers, it is difficult to say. The fact is that he became disobedient, untruthful, secretive, and moody; he refused to apply himself to his studies; and his teachers were reduced to despair. His friends turned against him, and even Stanhope was led to mistrust him. On Dec. 14, 1833, he rushed into his teacher's room, and with wild gestures and broken speech gave him to understand that he had been stabbed. Four days later he died.

The above statements in the case are generally accepted. Further details, however, are uncertain. Hauser's account of his early life, many of the particulars of which conflict, was to the effect that he had lived in a dark "prison," too small to permit of an upright posture or any freedom of movement; that his diet was bread and water, and that he slept on straw; and that shortly before his appearance in Nuremberg "the man" had taught him to write and to walk. The best test of this narrative would, of course, be a report of his physical condition by persons who saw him when he first appeared. Unfortunately, however, the testimony of such witnesses, taken under oath on two separate occasions—the first a year and a half, the second six years after the event—shows the influence both of the long intervals of time and of the numerous speculations which the case had aroused. The evidence of other observers is no less confusing. If Hauser's account be accepted, the theory prevalent at the time, that he was the victim of a nefarious crime, must be considered as probable. It was supposed that he had been kidnaped while an infant and kept in solitary and dark confinement with the purpose of reducing him to idiocy, so that his identity would be lost. (It was further asserted that he was, in truth, the Crown Prince of Baden, the legitimate son of the Grand Duke Charles; and that he had been kidnaped at Karlsruhe in October, 1812, by agents of the morganatic wife of the Grand Duke, who desired to secure the succession to her own offspring. This theory has persisted, despite the publication of the official record of the baptism, the autopsy, and the burial of the heir in question.) But the inconsistencies and the imaginative character of Hauser's narrative make its acceptance questionable; and his stories of the attempts made upon his life were seriously doubted by Stanhope and his teacher.

If the known facts only are taken into consideration, the case may be explained on the hypothesis that Hauser was suffering from the form of hysteria known as somnambulism. (See HYSTERIA; DOUBLE CONSCIOUSNESS.) This view seems the more probable since we know that he was frequently subject to convulsive attacks, and that he was both neurasthenic and hysterical. He had, it may be supposed, a total amnesia for the events of his earlier life; and the autobiographies were pure inventions, created out of his insatiable desire for attention and notoriety. For the same reason the two injuries, the second of which resulted in his death, were self-inflicted.

Consult: Feuerbach, *Beispiel eines Verbrechens am Seelenleben* (Ansbach, 1832); Stanhope, *Materialien zur Geschichte K. Hauser's* (Heidelberg, 1836); Evans, *Story of Kaspar Hauser from Authentic Records* (London, 1892); Lang, "The Mystery of Kaspar Hauser," in *Historical Mysteries* (ib., 1904); "Kaspar Hauser," in *Quarterly Review* (ib., 1888).

HAUSMANNITE, hous′mȧn-īt. A manganese manganate crystallizing in the tetragonal system, black in color, with a submetallic lustre. Hausmannite occurs with other manganese ores in Thuringia, in the Harz District of Germany, and in Sweden.

HAUSRATH, hous′rät, ADOLF (1837–1909). A German Protestant theologian, born at Karlsruhe. He was educated at Jena, Göttingen, Berlin, and Heidelberg, and was appointed professor extraordinary of ecclesiastical history at Heidelberg in 1867. His publications include: *Der Apostel Paulus* (2d ed., 1872); *Neutestamentliche Zeitgeschichte* (3d ed., 1875–79); *D. F. Strauss und die Theologie seiner Zeit* (1876–78); *Arnold von Brescia* (1891); *Peter Abälard* (1893); *Martin Luthers Romfahrt* (1894); *Die Arnoldisten* (1895); *Karl Holsten* (1897); *Aleander und Luther auf dem Reichstage zu Worms* (1897); *Alte Bekannte* (1899–1901); and, under the name "George Taylor," the historical novels *Antinous* (1880), *Klytia* (1883), *Jetta* (1884), *Elfriede* (1885), and *Peter Maternus* (1898); and the stories *Unter dem Katalpenbaum* (1899) and *Potamiäna* (1901).

HAUSSA STATES. See HAUSA STATES.

HÄUSSER, hois′ẽr, LUDWIG (1818–67). A German historian and politician, born at Kleeburg in Lower Alsace. He entered the University of Heidelberg as a student of philology, but under Schlosser's influence soon devoted himself to history, the study of which he continued at the University of Jena. After his graduation he taught for a number of years, spent some time in Paris, and in 1845 was appointed professor of history at Heidelberg. Soon afterward he became interested in the political movements of the day and wrote a pamphlet on *Schleswig-Holstein, Deutschland und Dänemark* (1846). At the beginning of 1847 he was chosen an editor of the *Deutsche Zeitung*, and in November of the same year was elected to the Second Chamber of the Baden Legislature, where he supported the federal constitution. He took no part in the May revolution of 1849, and the next year again became a member of the Legislature, but resigned in October and devoted himself to his historical studies. From 1860 to 1865 he was again a member of the Second Chamber and supported the Liberal ministry. He was one of the founders of the *Süddeutsche Zeitung*, and in December, 1863, took part in the assembly of representatives of the German states at Frankfort. He was a member of the "little German" party, which worked to exclude Austria from the confederation. Though Häusser was conspicuous in politics, his fame rests chiefly upon his historical works. He was a brilliant and inspiring lecturer. His chief work, *Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Gründung des deutschen Bundes* (4 vols., 1854–57; 4th ed., 1869), is a striking achievement of modern German methods of historical research. Among his numerous other publications are *Geschichte des Zeitalters der Reformation* (1868; 2d ed., 1879) and *Geschichte der Französischen Revolution* (1867; 3d ed., 1891), which were issued after his death. Many of his lectures, edited from stenographic reports, have also been published.

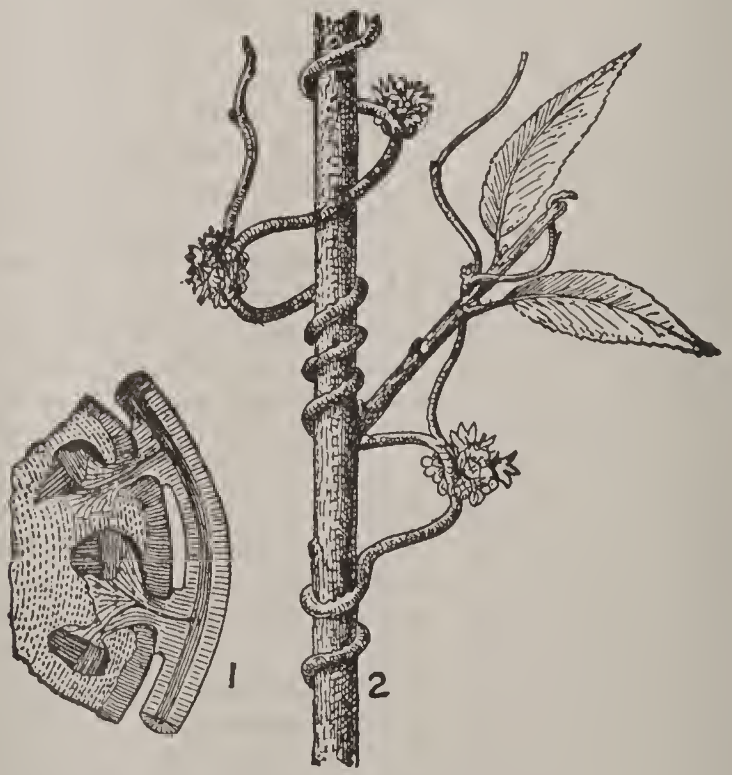
HAUSSEZ, ŏ′sȧ′, CHARLES LEMERCIER DE LONGPRÉ, BARON D' (1778–1859). A French politician, born at Neufchâtel, of an aristocratic family, and famous for his maxim "All for the people, nothing by the people." At 16 he began to take a part in conspiracies against the Directory and the Consulate and was an enthusiastic supporter of the Empire, but joined the Royalist party on the return of the Bourbons. In 1829 he became Naval and Colonial Minister and in the following year was forced to flee to England because of his loyalty to Charles X. He was condemned to perpetual imprisonment; but in 1839, after extensive travels in Italy, Switzerland, and Germany, benefited by the amnesty to return to France. Among Haussez's works the following may be mentioned: *Réflexions d'un ami du roi* (1816); *La Grande Bretagne en 1833* (1833); *Voyage d'un exilé* (1835); *Alpes et Danube* (1837); *Etudes morales et politiques* (1844 and 1851). From his political memoirs excerpts were published in the *Revue de Paris* (1894).

HAUSSMANN, ōs'mäN', Georges Eugène, Baron (1809–91). A French official under the Second Empire, whose name is associated with the reorganization of the physical conditions in the city of Paris. He was born in Paris and was educated at the Conservatory of Music, but became an advocate. After the revolution of 1830 he was sous-préfet successively of Nérac, Saint-Girons, and Blaye, and under the presidency of Louis Napoleon was Prefect of Var, the Yonne, and Gironde. He was appointed Prefect of the Seine in 1853. While holding this office, Haussmann expended many millions of dollars in rebuilding and beautifying Paris. Parks were planted on the sites of hovels; splendid boulevards were run through the city; square were laid out; statues, bridges, and magnificent public buildings sprang up with almost miraculous rapidity. In carrying on his work Haussmann let no considerations of private rights or financial expediency stand in the way. His enemies accused him of systematic peculation and declared that his broad boulevards were intended for the rapid mustering of troops and cannon in case of any uprising against the Empire. A stinging pamphlet by Jules Ferry, *Les comptes fantastiques de Haussman*, and the enmity of Ollivier, who became Minister in 1870, brought about Haussmann's downfall. His work, however, had done much to make the Second Empire popular. In 1857 he was made a senator and elected a member of the Academy of Fine Arts. He was likewise a member of the Imperial Council of Public Instruction. After the fall of the Empire he quitted France for a time. On his return he was appointed director of the Crédit Mobilier and did much to improve the condition of that financial institution. In 1877 he was returned to the Chamber of Deputies by the Arrondissement of Ajaccio in Corsica. He died in Paris on the 11th of January, 1891. The Boulevard Haussmann is named for him. Consult his *Mémoires* (Paris, 1890–93).

HAUSSONVILLE, ō'sôN'vēl', Gabriel Paul Othenin de Cléron, Count d' (1843–). A French author and politician, born at Gurcy-le-Châtel. Elected a deputy in 1871, he voted with the Right Centre. He failed of reëlection in 1876 because of his lack of loyalty to the Republic and in 1877 retired to private life and literary labors. He was elected to the French Academy in 1888. A stanch Orleanist, he was an active leader of his party until the death of the Comte de Paris, in 1894. Haussonville's more important works are: *Les établissements pénitentiaires en France et aux colonies* (1875); *Sainte-Beuve* (1875); *L'Enfance à Paris* (1879); *Le salon de Mme. Necker* (1882); *Etudes biographiques et littéraires* (1879–81); *Mme. de La Fayette* (1891); *Socialisme et charité* (1895); *Lacordaire* (1896); *La duchesse de Bourgogne et l'alliance savoyarde* (1898–1901); *Paris charitable et bienfaisant* (1912). In collaboration with G. Hanotaux, he published *Souvenirs sur Madame de Maintenon* (3 vols., Paris, 1902–04).

HAUSSONVILLE, Joseph Othenin Bernard de Cléron, Count d' (1809–84). A French statesman and author, born in Paris. He was Secretary to the Embassy at Brussels, then at Turin, then at Naples, and from 1842 to 1848 represented Provins in the Chamber of Deputies. He was not a great speaker, but was an active member of the Conservative party until the revolution of 1848, when he retired and devoted himself to literature. His most important works are: *Histoire de la politique extérieure du gouvernement français de 1830 à 1848* (1850); *Histoire de la réunion de la Lorraine à la France* (1854–59); *L'Eglise romaine et le premier empire* (1864–69), the work which gained him admission to the Academy in 1869. During the Franco-German War he wrote political letters valuable for their opportuneness more than for their literary style, notably *La France et la Prusse devant l'Europe.* After the peace he became the protector of exiles from Alsace and Lorraine who wished to continue under French rule. His wife, Louise de Broglie, was also a writer, and the Count supported her brother, the Duke, in politics, against M. Thiers. He became senator for life in 1878.

HAUSTO'RIA (Neo-Lat. nom. pl., from *haustor*, drawer, from *haurire*, to draw). A term applied to special structures which are found in a variety of plants, and whose function is that of attachment and suction. Some of the best illustrations of such outgrowths are found among parasitic fungi, in which the mycelium puts out processes that penetrate the cells of their hosts. In the interior of the host cell the haustorium usually enlarges, and through the greatly increased surface it is able rapidly to absorb nourishment for the fungus. Such haustoria generally cause the death of the host cells.



HAUSTORIA OF DODDER.

1. Haustorium enlarged. 2. Dodder vine, showing positions of haustoria.

Haustoria of a far more complicated structure are found in higher plants, as the dodder (*Cuscuta*), and such parasites as the beechdrop and broom rape (Orobanchaceæ), which live on the roots of certain plants. In these groups the haustoria are probably really adventitious roots, but the structure becomes greatly modified. They penetrate the tissue of the host and establish a direct connection with the conducting vascular bundles, so that the parasite actually taps the sources of food supply, water, and organized food material, and draws off what it needs. See DODDER.

HAUTBOIS, hō′boi. See OBOE.

HAUTEFEUILLE, ŏ̇t′fē̃′y′, PAUL GABRIEL (1836–1902). A French mineralogist and chemist, born at Etampes, and educated at the Ecole Centrale, in which he taught metallurgy, and was director of the chemical laboratory until 1885. In that year he became professor of mineralogy in the University of Paris. His written work appeared mostly in technical journals, especially in the *Comptes Rendus* of the French Academy of Sciences.

HAUTE-GARONNE, ŏ̇t′gȧ′rŭn′. A department in the south of France, bounded on the south by the Pyrenees (Map: France, S., F 5). Area, 2458 square miles; pop., 1901, 448,441; 1911, 432,126. From the foothills of the northern part it gradually rises in the south until it attains a height of 10,000 feet in the Pyrenees. It is watered by the Garonne, within the basin of which it lies. The soil in the valleys is very productive and yields heavy crops of grain, maize, beans, and vegetables. Orchard fruits, with melons, chestnuts, and tobacco, are produced in abundance, and the annual yield of wine is large. Rock salt is produced, fine marble quarried at Saint-Béat, and zinc and lead are found in the mountains. The chief manufactures are woolen and cotton fabrics, hardware, boots and shoes, and tobacco. The department was formerly divided between the provinces of Languedoc and Gascony. Capital, Toulouse.

HAUTE-LOIRE, ŏ̇t′lwär′. A central department of France, formed mainly from portions of Auvergne and Languedoc (Map: France, S., H 3). Area, 1931 square miles. The surface is mountainous, covered by the Cévennes, Boutières, Megal, and the Margeride chain. The chief rivers are the Loire, the Allier, the Borne, and the Lignon. The soil of the plains is fertile, and agricultural produce, consisting of grain, vegetables, and fruits, is abundant. Fine cattle are raised, and iron, coal, copper, lead, and other minerals are found. There are important manufactures of silk and lace, the latter employing over 90,000 women. Capital, Le Puy. Pop., 1901, 314,058; 1911, 303,838.

HAUTE-MARNE, ŏ̇t′märn′. A department in the northeastern part of France, southeast of the Department of Marne (Map: France, N., L 4). Area, 2416 square miles. The surface is generally hilly and mountainous in the south and east, descending in gentle slopes towards the north, or Bassigny; about one-fourth is in forest. The principal rivers are the Marne, with its tributaries, and the Meuse. Oats and wheat are largely cultivated, and wines are produced in several parts—Aubigny and Montsaugeon. The department is rich in iron ore, the production of which forms the principal branch of industry. Cutlery, basket making, brewing, and tanning are also carried on. Capital, Chaumont. Pop., 1901, 226,545; 1911, 214,765.

HAUTERIVE, ŏ̇′t′rê̇v′, ALEXANDRE MAURICE BLANC DE LANAUTTE, COUNT D' (1754–1830). A French diplomat and statesman, born at Aspres and educated at Grenoble, where he became a professor, and at Tours. In 1792 he was made Consul at New York. A false accusation lost him this post, and he was forced to live as a farmer in America until 1798, when he was recalled and appointed chief of the first division of political correspondence in the Ministry of Foreign Affairs. His brochure, *De l'état de la France à la fin de l'an VII*, undertaken at the order of Bonaparte, won him a high place under the Consulate and Empire, and he frequently served as Minister of Foreign Affairs in the absence of Talleyrand. He was decorated with the cross of the Legion of Honor for his fidelity to Napoleon. But his policy of an Austrian alliance clashed with his chief's demand for a Prussian alliance, and he was transferred to the post of director of archives. He directed the affairs of the French cabinet during the Congress of Aix-la-Chapelle. In his later years he interested himself in archæology, wrote on Egyptian antiquities, and was elected to the Society of Inscriptions (1820).

HAUTES-ALPES, ŏ̇t′zȧlp′. A southeastern department of France, on the Italian frontier, formerly part of the ancient provinces of Dauphiné and North Provence (Map: France, S., L 4). Area, 2178 square miles; pop., 1901, 109,510; 1911, 105,083. It is traversed by the Cottian Alps, which reach their maximum altitude in the department in Les Ecrins (13,462 feet). The chief river is the Durance, noted for its picturesque scenery; also the Drac and the Buëch. Marble is quarried, and anthracite coal and argentiferous lead are mined. The soil is poor and rocky, the average temperature low, and little grain is raised. Pasturage of sheep has destroyed much valuable timber. Capital, Gap.

HAUTE-SAÔNE, ŏ̇t′sŏ̇n′. A northeastern department of France, bounded on the north by the Department of Vosges, and on the east by Belfort (Map: France, N., M 5). Area, 2075 square miles. It is traversed from north to south by the Saône River. About one-half of the entire area is cultivable land; more than a fourth, comprising the north and northeast districts, is covered with forest-clad mountains. The fertile plains lie at the south, ascending to hills at the north. The highest point is the Ballon de Severance (3970 feet). Fruits and tobacco are largely cultivated. Sheep, including some flocks of the merino breed, and cattle are raised in large numbers. Its main manufacture is of iron; also textiles, hosiery, hats, lumber, and chemicals. Coal, copper, manganese, and salt are found. Capital, Vesoul. Pop., 1901, 266,605; 1911, 257,606.

HAUTE-SAVOIE, ŏ̇t′sȧ′vwä′. An eastern department of France, bordering on Switzerland and Italy, formerly part of Savoy, bounded on the north by Lake Geneva. Area, 1750 square miles (Map: France, S., L 2). The summit of Mont Blanc (15,782 feet) is situated in this department; about one-fourth of the surface is forested. The lowest land in the department is 945 feet above sea level; the entire region is a favorite one with tourists. The Rhone is the principal river. In the north, south, and west, some wheat, oats, and fruit are cultivated, but the chief agricultural industry is pastoral. Some coal and asphalt mines are worked, and there are a few manufactures. Capital, Annecy. Pop., 1901, 263,803; 1911, 255,137.

HAUTES - PYRÉNÉES, ŏ̇t′pē̇′rȧ′nȧ′. A southwestern department of France, part of the old Province of Gascony, lying east of the Basses-Pyrénées (Map: France, S., E 5). Area, 1750 square miles. As its name implies, it contains some of the loftiest summits of the Pyrenean chain (the Vignemale, 10,820 feet). The aspect of the scenery is varied. Mountains and precipitous rocks in the south, with a mild climate, attract many tourists; in the central part are agreeable diversifications of hill and dale; while the north has fertile plains. The principal rivers, none of them navigable, are the Adour, the Neste, and the Gave de Pau. The well-cultivated and artificially watered lowlands yield good crops of cereals, vegetables, flax, and fruit of every kind, including the grape, from which excellent wine and brandy are made. The horses are a famous breed, and mules, cattle, sheep, swine, and poultry are raised, and pasturage is carried on in the highlands. The chief manufactures are lumber and textiles. This department—which is the richest part of the Pyrenees in mineral products, especially marble, copper, manganese, lignite, iron, zinc, lead, antimony, slate, and granite—contains also the celebrated sulphur springs of Saint-Sauveur and Capvern, and the hot baths of Bagnères, Barèges, and Cauterets. Capital, Tarbes. Pop., 1901, 215,546; 1911, 206,105.

HAUTE-VIENNE, ŏ̇t′vyĕn′. A west central department of France, formed mainly from portions of the old Limousin, Marche, Pitou, and Berry. Area, 2145 square miles (Map: France, S., F 3). It is traversed by the Monts du Limousin, ranges of low hills, well wooded, which form the dividing line between the basins of the Garonne and Loire. The Vienne River crosses the department from east to west, and there are also the Isle and the Dronne. Though the soil is mostly rocky and sterile, rye, wheat, and other cereals are cultivated in the valleys; cattle are raised on the extensive meadowlands, and chestnuts are grown for local consumption and export; the soil generally, however, is stony, and agriculture is in a backward condition. Mines of iron, lead, copper, and antimony are worked; granite and other building stone are quarried, amianthus, emeralds, and garnets are found, and in the south, near Saint-Yrieix, there are valuable deposits of kaolin, from which the porcelain factories of Sèvres and Limoges draw in part their supplies. Capital, Limoges. Pop., 1901, 381,753; 1911, 384,736.

HAUT-RHIN, ŏ̇′rǎɴ′. A former department of France. See BELFORT, TERRITORY OF.

HAÜY, ȧ′wē̇′, RENÉ JUST (1743–1822). A French mineralogist, born in Saint-Just, France. He was educated for the Church and took priest's orders. While engaged in teaching in Paris, he acquired a fondness for botany, but subsequently, hearing Daubenton lecture on mineralogy, he developed an interest in that science. The accidental dropping of a crystal of calcite revealed to him the geometric law of crystallization, on which subject he published more than 100 papers. During the Revolution he was thrown into prison, but was released through the influence of Geoffroy Saint-Hilaire. In 1793 he was appointed on the Commission of Weights and Measures and took a prominent part in the evolution and development of the metric system. In 1794 he became keeper of the cabinet of mines. Subsequently, in 1802, he became professor of mineralogy in the Museum of Natural History in Paris, where his magnificent collection of crystals is still preserved. Besides being an honorary canon of Notre Dame, he was a member of the French Academy and of other scientific societies. Abbé Haüy's principal works are: *Traité de minéralogie* (1801), in which he contended that the crystalline form should be the principal element in the determination of a mineral; *Traité élémentaire de physique* (1803); *Traité des charactères physiques des pierres preciéuses* (1817); *Traité de crystallographie* (1822).

HAÜY, VALENTIN (1746–1822). A French teacher of the blind, brother of René Just Haüy, born in Saint-Just. It is said that his interest in a pianiste stricken with blindness first stimulated his search for a means to alleviate the affliction. This means he first discovered in the printing of raised maps and letters. He started schools for the purpose of giving manual, mathematical, and musical training to the blind; but his zeal outran his discretion, and others excelled him in the carrying out of his ideas. During the ascendancy of Napoleon he lived in St. Petersburg for more than 10 years, working there for the blind. He was twice married, though a priest. The Association Valentin Haüy for the care of the blind does important work among the poor of Paris. His publications include *Essai sur l'éducation des aveugles* (1786) and *Mémoire historique sur les télégraphes* (1810). Consult Strebitzky, *Valentin Haüy à Saint Pétersbourg* (Paris, 1884).

HAÜYNITE, ä′wē̇-nīt, or **HAÜYNE,** ä′wē̇n. A sodium, calcium, aluminium silicate and sulphite that crystallizes in the isometric system, has a vitreous lustre, and is usually blue to green in color, or more rarely red or yellow. It is found chiefly in igneous rocks, usually in association with nephelite and lucite, occurring especially in volcanic regions, such as in the lavas of Vesuvius, on Mount Somma, and elsewhere in Italy; also in the Azores, Canary, and Cape Verde islands, and in the United States it is found in Montana. The mineral is named after the famous French mineralogist Haüy.

HAVANA, hȧ-vä′nȧ *or* hȧ-văn′ȧ (Sp. *La Habana*). The capital of Cuba and the largest city in the West Indies, situated on the north coast of the island, in lat. 23° 8′ N. and long. 82° 22′ W. (Map: Cuba, C 3). It lies on a peninsula bounded by the Gulf of Mexico and the Bay of Havana. The latter is regarded as one of the safest harbors of the world, while its depth is sufficient for vessels of the greatest draft; its narrow entrance is protected by the Punta Castle on the west and Morro Castle and La Cabaña on the east. Havana comprises an area of about 9 square miles and is protected by a sea wall on the west. The older portion of the city, which was formerly surrounded by a wall begun in 1633 and demolished in 1863–80, has all the shortcomings of an old colonial town. Its streets are narrow and crooked and up to the time of the American occupation were in a state of the utmost neglect. Beyond the limits of the old city, however, Havana is essentially modern. The well-laid-out and broad streets, the abundance of promenades, and picturesque plazas would do credit to any city on the continent. The houses are generally low and built in the Spanish style, which, however, is relieved by the bright coloring of the walls and roofs. The atmosphere, also, is generally bright and clear, as there are very few days wholly clouded, the rain generally falling in the afternoon. The climate, though tropical, is tempered by alternating land and sea breezes. The mean temperature is 78° F. for the warmest and 70° F. for the coolest month, the extremes being 50° and 90° F. The humidity, however, is above 80 per cent at all seasons.

In the old city, and near the inner entrance to the harbor, is the Plaza de Armas, fronting which on the west stands the former governor's palace. To the north of this plaza is La Fuerza, the oldest structure in the city, built as a defense in 1538 by Hernando de Soto. Beginning at the Castillo de la Punta at the outer harbor entrance, and running outside the old city wall, is the Prado, a wide and beautiful boulevard with a double row of shade trees along the middle. It terminates in the Colón Park, or Campo Marte, the largest in the city, planted with trees and palms, and having a fountain in the centre. Running west from Colón Park is the Calle de La Reina, which is continued as the Paseo de Tacón, a splendid drive passing the Botanical Gardens and terminating at the citadel of El Príncipe outside of the city. At the east entrance stands a fine statue by Canova of Charles III, and from its west end a road leads to the Colón Cemetery with a magnificent entrance of three granite arches, and containing numerous fine monuments, among which the firemen's monument, made entirely of marble, and erected to the memory of 30 firemen who perished in the performance of their duty, is a magnificent piece of monumental sculpture. Other notable promenades are the Alameda de Paula and the Calzada de La Infanta, a fine boulevard skirting the city on the west. The commercial section is in the eastern part of the city, where well-appointed retail stores are to be found in the calles (streets) del Obispo, de O'Reilly, and de San Rafael. The city has electric street railways; 19,482,472 passengers were carried in the first four months of the year 1914.

The public buildings of the capital are not far behind its natural embellishments; the executive mansion and the cathedral dating from 1724, which contained, until 1898, the remains of Columbus, are among the most prominent. It is now proposed to build a million-dollar capitol. The educational institutions include the University of Havana (see HAVANA, UNIVERSITY OF) with three faculties; the Jesuit College de Belén, a museum and library, a conservatory of music, a normal school, and a number of minor schools. The theatres are numerous, and one of them, the Teatro Tacón, is one of the largest playhouses in the world. There are numerous hotels and clubs in the city; and the newspapers and periodicals number over 100, the leading ones being *La Lucha, El Diario, La Discusión*, and the financial and commercial journal *El Avisador Comercial*. The water supply is excellent, and the public works show a generally improved condition in recent years. At the end of the Spanish-American War the American authorities found the city in a woefully unsanitary condition. The streets were unswept, garbage was piled in heaps, and the pavements were in a miserable condition, especially in the old city. The sewerage system was hardly more than a name. The existing sewers were in some places completely clogged, and all of them leaked, contaminating the surrounding soil. In 1902, however, the city was handed over to the new Republic in a wonderfully improved condition. A well-regulated system of street cleaning and garbage collection was put in operation. Many of the streets were repaved, and various kinds of experimental pavements were laid. Contracts were let for a new sewer system, and a complete survey of the city, with a view to adopting a system of street grades, was made. Streets, hospitals, and other buildings were so thoroughly disinfected that yellow fever, which during the war carried off many thousands of people, has been wholly eradicated.

The chief industrial establishments of Havana are its cigar and tobacco factories, which are the largest in the world. Other industries are carried on on a smaller scale. Besides boxes and barrels for the tobacco and the sugar trade, wagons and carriages are manufactured, and even some machinery, and the tendency is towards a diversification of industries. The exports consist chiefly of cigars, tobacco, and sugar, which mostly find their way to the United States. Havana is the chief outlet for the products of the island. It is connected by steamers with the United States, France, England, and Spain, and by rail with every important centre on the island. The imports consist chiefly of foodstuffs and cotton. Since the evacuation of the island by Spain the commerce of Havana has shown a considerable increase. The total value of the foreign commerce for 1912 was $137,727,000, of which $87,324,000 represented imports, and $50,403,000, exports. About one-half of the imports are from the United States and about two-thirds of the exports are to that country. During the same year 1745 vessels in the foreign trade, with a net tonnage of 3,209,552, entered the port, and 1701, with a net tonnage of 3,164,240, cleared; of coasting-trade vessels, 2383, of 522,871 gross tons, entered, and 2385, of 518,256 gross tons, cleared. The receipts of the Havana customhouse for the year amounted to $19,391,754, the import duties contributing $18,953,227 of the total. In the foreign trade $81,415,000 worth of merchandise was carried in American bottoms. The extensive commerce of Havana is greatly facilitated by the numerous financial institutions situated in the city. The population of Havana, including its suburbs, was 242,055 in 1899, against 200,448 in 1887; in 1902, 262,395; in 1907 (census), 297,159; in 1914 (est.), 325,000. In 1912, 32,631 immigrants arrived at Havana, of whom 30,378 were Spanish and 547 North Americans.

The Bay of Havana was discovered in 1508 by Sebastian de Ocampo. The city itself was originally founded in 1515 on the south coast, by Diego de Velasquez, but in 1519 it was transferred to its present site. It was sacked and burned by pirates in 1538, was plundered by another band in 1555, having by that time become Spain's chief naval station in the New World, and was again despoiled in 1563. It was unsuccessfully attacked by Drake in 1585, after which the forts El Morro and La Punta were built. During the seventeenth century it was several times attacked and blockaded by Dutch fleets, while pirates were continually hovering around, on the watch for unprotected galleons. During the eighteenth century the city was several times threatened by the English, who took Morro Castle by assault in 1762 and captured the city, remaining in control for a year. The United States battleship *Maine* was blown up in the harbor on Feb. 15, 1898; the remains were long an obstruction to the harbor, until removed and sunk in the ocean by the American government in 1912. During the Spanish-American War the city and harbor were blockaded by the American fleet. For a good description of Havana, consult Norton, *Complete Handbook of Havana and Cuba* (Chicago, 1901), and F. A. Ober, *Guide to the West Indies* (New York, 1908).

HAVANA. The smallest but most important and most populous province of Cuba. It occupies a band running across the western part of the island from the Gulf of Mexico to the Caribbean Sea and is bounded by the Province of Pinar del Río on the west and Matanzas on the east. Its area, including the Isle of Pines (q.v.), is 2772 square miles. Its surface is rather low and undulating, with some undefined elevations in the interior. The forests yield valuable cabinet timber, and the principal agricultural products are sugar cane, tobacco, pineapples, yucca, bananas, corn, and vegetables. Havana is the principal manufacturing province of the Republic, and has numerous large cigar and cigarette factories, as well as sugar mills, foundries, tanneries, saw mills, and distilleries. The province is as densely populated as the State of Connecticut; its population in 1887 was 451,928, and in 1910, 575,266. The capital is Havana.

HAVANA. A city and the county seat of Mason Co., Ill., 40 miles southwest of Peoria, on the Illinois River, which is here spanned by a bridge, and on the Illinois Central and the Chicago, Peoria, and St. Louis railroads (Map: Illinois, E 5). It is a popular summer resort and has manufactures of shovels, gasoline engines, farm implements, cutlery, cooperage, etc., and a considerable trade in fish, agricultural produce, grain, and fruit. The city owns its water works. Pop., 1900, 3268; 1910, 3525.

HAVANA, UNIVERSITY OF. An institution for higher education founded at Havana, Cuba, in 1728. There are faculties of philosophy, medicine, and law, and the university includes schools of letters and philosophy, pedagogy and science, engineering and architecture, electricity, agriculture, medicine and pharmacy, dental and veterinary surgery, and law. Until the American occupation of Havana the university was housed in the old convent of Santo Domingo. Better quarters were provided in 1900 by the American military government. The attendance in the departments in 1913–14 was about 1070. The yearly income is about $400,000. The libraries contain 100,000 volumes. The rector of the university in 1914 was Dr. Leopoldo Berriel y Fernández.

HAVARD, å′vär′, HENRY (1838–). A French art historian, born at Charolles. An exile from France because of his part in the Commune, he returned after the amnesty. His stay in Italy, Belgium, and Holland determined his choice of art criticism as a vocation. Devoting himself at first to the painting of Holland, he later became a recognized authority on the decorative arts. In 1887 he was appointed inspector general of fine arts, and Officer of the Legion of Honor. Among his important works are: *La Hollande pittoresque* (1874–78); *Amsterdam et Venise* (1876); *L'Art et les artistes hollandais* (1879–81); *Histoire de la peinture hollandaise* (1881); *La Hollande à vol d'oiseau* (1880); *La Flandre à vol d'oiseau* (1882); *L'Art dans la maison* (1884); the valuable *Dictionnaire de l'ameublement et de la décoration* (1887–90); *Les manufactures nationales* (1888), with Vachon; *Van der Meer de Delft* (1889); *Les Boulle* (1893); *L'Orfèverie* (1896); *Les arts de l'ameublement* (12 vols., 1891–97); *Histoire et philosophie des styles* (1899–1900); *L'Art et le confort dans la vie moderne* (1904).

HAVAS (å′vå′) **AGENCY.** An organization in Paris, founded by a rich merchant, Charles Havas, in the reign of Louis Philippe, for the purpose of gathering telegraphic news and supplying it to newspapers. It was in 1879 converted into a company, with a capital of 8,500,000 francs.

HAVASUPI, hä′vå-sōō′pė. A small but interesting tribe of Yuman linguistic stock in the Coconino Cañon, northwestern Arizona. Although numbering only 174, their isolation has enabled them to preserve their primitive characteristics to a remarkable degree. Living as they do in the bottom of a cañon, isolated from the outside world by great perpendicular barriers of rock, the Havasupi Indians are perhaps nearer to the original estate than any other tribe in the Southwest. They are agriculturists and entirely self-supporting, having always possessed three years' provisions stored away in stone-built granaries in the clefts of the mountain walls. The women are expert basket makers. To the Spaniards they were known as Cojonino. Consult Goddard, *Indians of the Southwest* (New York, 1913). See YUMA.

HAVEL, hä′fel. A river of Germany, tributary of the Elbe (Map: Germany, H 5). It has its origin in a small lake a mile west of the town of Neustrelitz, in Mecklenburg, flows southward from its source to Potsdam, and thence west and northwest to its junction with the Elbe, opposite the town of Werben. Its entire length is 220 miles, and it is navigable to Fürstenberg, a town within 30 miles of its source. The Havel, forming for a considerable part of its course the connecting link to a long chain of lakes, is of great importance to the internal trade of Prussia, and is connected by canals with the Oder, Rhine, and Elbe rivers. Of its affluents, the Spree, which is longer than the Havel, is the only one worthy of mention.

HAVELOCK, hăv′lŏk. A town in Lancaster Co., Neb., 5 miles northeast of Lincoln, on the Chicago, Rock Island, and Pacific, and the Chicago, Burlington, and Quincy railroads (Map: Nebraska, H 4). It contains locomotive shops of the Burlington system and has a public library. The water works are owned by the town. Pop., 1900, 1480; 1910, 2680.

HAVELOCK, SIR HENRY (1795–1857). An English soldier. He was born April 5, 1795, at Bishop-Wearmouth, Durham, where his father was a merchant and a shipbuilder. He was educated at the Charterhouse and studied law at the Middle Temple, but abandoned the profession. He entered the army soon after the battle of Waterloo, went to India in 1823, and distinguished himself in the Afghan and Sikh wars. In 1854 he was made adjutant general of the troops in India, and in 1857 he commanded a division of the army that invaded Persia. News arriving of the Indian Mutiny, immediately after peace with Persia, he hastened to Calcutta. He was directed to organize a small movable column at Allahabad and to push on to the relief of Cawnpore and Lucknow. By forced marches and three sanguinary victories he reached Cawnpore and found the mutilated bodies of the English women and children who had been massacred upon his approach. An avenging column quitted Cawnpore to advance upon Lucknow. After eight victorious battles with vastly superior numbers of rebels, Havelock's little army, thinned by fatigue and sickness, was obliged to retire upon Cawnpore. Early in September, 1857, General Outram arrived with reënforcements: Havelock again advanced to the relief of Lucknow, Outram chivalrously refusing to take the command out of his hands. After desperate fighting at Mungulwar, at the Alam Bagh, and through the streets of Lucknow, they gained the Residency, to the joy of the beleaguered garrison, but were in turn besieged. They held their own until Sir Colin Campbell (later Lord Clyde) forced his way to their rescue on November 19. Havelock, unfortunately attacked by dysentery, died five days after the relief, on Nov. 24, 1857. His services had won him the distinction of K.C.B., and other honors, including a baronetcy, were conferred upon him before the news of his death reached England. The rank and the pension were subsequently given to his son. For his biography, consult: Brock (London, 1858); Marshman (new ed., ib., 1870); Forbes (ib., 1897).

HAV'ELOCK-AL'LAN, Sir Henry Marshman (1830–97). An English soldier, the son of Sir Henry Havelock, the reliever of Lucknow. He was born at Chinsurah, India, Aug. 6, 1830, and was educated at a private school in London. In 1846 he was commissioned an ensign in the Thirty-ninth Foot. He was a lieutenant in 1848 and an adjutant in 1852. In 1857 he saw active service in Sir James Outram's Persian campaign. After the outbreak of the Indian Mutiny he accompanied his father to Calcutta and served on his staff in his victorious march to the relief of Cawnpore and Lucknow. At Cawnpore, on July 16, 1857, his gallantry and daring in leading a charge for the capture of a gun won for him the Victoria Cross. In the advance from Cawnpore to Lucknow he was severely wounded. In January, 1858, the baronetcy and pension which it had been proposed to bestow upon his father were conferred upon him. He served until the suppression of the mutiny, received brevets of major and lieutenant colonel, and commanded Hodson's Horse in Lord Clyde's last campaign. He served in New Zealand under Sir Duncan Campbell in the Maori War of 1863–64 and as assistant quartermaster-general in Canada in 1867–69. On leave of absence and as a newspaper correspondent, he saw the Franco-German War of 1870–71 and the Russo-Turkish War of 1877–78. He was a member of Parliament as a Liberal (1875–81) and later as a Liberal-Unionist (1885–92) and from 1895 until his death. He took an active part in the debates and held the position of chairman of the Naval and Military Service Committee. In the latter capacity, during the parliamentary recess of 1897, he visited India to study the needs of the Indian army and visited the Afghan frontier, where a campaign against the hill tribes was in progress. Here, on Dec. 30, 1897, while accompanying the troops near Ali Masjid, an unmanageable horse carried him beyond the lines, and he was fired upon and killed by some Khaibaris who were harassing the British flank. He took the additional surname of Allan in 1880 and retired from the active list of the army in 1881 with the rank of lieutenant general. He wrote *Three Main Military Questions of the Day* (1867). Consult: Kaye, *History of the Sepoy War* (London, 1864–75); Malleson, *History of the Indian Mutiny* (ib., 1878–80); Marshman, *Life of Sir Henry Havelock* (ib., 1870).

HAVELOCK THE DANE, The Lay of. An Anglo-Danish legend of early England. Gaimar, an Anglo-Norman chronicler of the twelfth century, speaks of it as an ancient story. The earliest form is a French version, *Le lai de Aveloc*, abridged by Gaimar. The old French and an English version of the later thirteenth century were published by Sir F. Madden for the Roxburgh Club (1828), and *The Lay of Havelock the Dane* was edited by W. W. Skeat in the "Early English Text Series" (1868). Consult: F. Brie, "Zum Fortleben der Havelok Sage" in *Englische Studien*, xxxv, 359 (Leipzig, 1905); L. A. Hibbard, *Three Middle English Romances* (London, 1911); C. W. Whistler, *Havelok the Dane* (ib., 1912). See Grim.

HAVEMANN, hä've-mȧn, Wilhelm (1800–69). A German historian, born in Lüneburg, Hanover. He studied law in the universities of Göttingen and Erlangen. In 1825 he was arrested for his alleged revolutionary activity and was sentenced to five years' imprisonment. After his release he taught in various schools until 1838, when he became a professor in the University of Göttingen, where he was admitted to the Gesellschaft der Wissenschaften (1850). From 1841 to 1848 he edited the *Göttinger gelehrten Anzeigen*. His most important work is the *Geschichte der Lande Braunschweig und Lüneburg* (rev. ed., 1853–57).

HAVEMEYER, hăv'e-mī'ẽr, Henry Osborne (1847–1907). An American sugar manufacturer, born in New York City. After three years (1865–68) of training in the Havemeyer business of sugar refining in Williamsburgh, Brooklyn, he became a partner in the firm of Havemeyer and Elder, his study of production and market conditions gaining him controlling influence. When the American Sugar Refining Company was formed in 1891, he was chosen vice president and soon afterward its president. Under his direction the capitalization of the corporation was increased from $50,000,000 to $75,000,000, and half of the stock of the Spreckles Company was acquired, thus giving his company control of the Hawaiian sugar and of the markets west of the Mississippi River. He became president also of the American Coffee Company. In 1897 Havemeyer was arrested on a charge of contempt for refusing to answer the questions put to him by a committee of the United States Senate, but he was acquitted.

HAVEMEYER, William Frederick (1804–74). An American politician. He was born in New York City, of German parentage, graduated at Columbia in 1823, and went into the sugar-refining industry with his father. In 1842 he retired from business with a good fortune and devoted himself to politics. He was an enthusiastic Democrat and was elected mayor of New York in 1845 and in 1848 by large majorities, and for a third time in 1872, but by a narrow margin. His first two terms were marked by the thorough care he bestowed on even the smallest details of his office and the honesty and economy he exacted. His third administration was less successful than the others in his appointments, and contentions with the aldermen monopolized the greater part of his time. An appeal was made to the Governor for his removal, but was not acted upon. He was president of the Bank of North America from 1851 to 1861 and brought it successfully through the crisis of 1857. His fearlessness and political experience were of the greatest value in the overthrow of the Tweed "ring."

HA′VEN, Alice Bradley (1828–63). An American author. Her maiden name was Emily Bradley, and she was born at Hudson, N. Y. Her first writing appeared in the Philadelphia *Saturday Gazette,* to whose editor, Joseph C. Neal, she was married in 1846. She assumed the name of Alice and wrote under the pen name of "Cousin Alice." After her husband's death, in 1847, she took editorial charge of his paper and still found time to contribute many poems and short stories to other periodicals. In 1853 she married Samuel L. Haven. Her works include *The Gossips of Rivertown* (1850) and *The Good Report* (1860). Consult *Cousin Alice: A Memoir of Alice B. Haven* (New York, 1865), which is made up of parts of her diary.

HAVEN, Erastus Otis (1820–81). An American educator and Methodist Episcopal bishop. He was born in Boston, graduated at Wesleyan University in 1842, and after a short period of teaching in preparatory schools entered the Methodist ministry (1848). In 1853 he was chosen professor of Latin in Michigan University, and in 1856–63 he was editor of *Zion's Herald* in Boston. He served in 1862–63 in the Massachusetts Senate, where he displayed especial interest in educational matters. In 1863–69 he was president of the University of Michigan and for three years thereafter president of Northwestern University. He was corresponding secretary of the Methodist Episcopal board of education in 1872–74, when he was chosen chancellor of Syracuse University. In May, 1880, he was ordained a bishop. Among his works are: *The Young Men Advised* (1855); *Pillars of Trust* (1866); and a treatise on *Rhetoric* (1869). Consult his *Autobiography,* edited by C. C. Stratton (1883).

HAVEN, Gilbert (1821–80). An American Methodist Episcopal bishop. He was born at Malden, Mass., graduated at Wesleyan University in 1846, taught for several years, and in 1851 joined the New England conference. He was for a short time chaplain of a Massachusetts regiment in the Civil War. In 1862 he traveled in Europe for his health and on his return was two years a preacher in Boston. In 1867 he became editor of *Zion's Herald,* holding the place until elected a bishop in 1872. For some years he had manifested great interest in the welfare of negroes, especially in the Southern States, and had supervision of relief for destitute freedmen in Mississippi. As Bishop, he was stationed at Atlanta, Ga., with special charge of the interests of his church in the South. He was an earnest advocate of Protestant missions in Mexico and described his missionary journey to that country in *Our Next-Door Neighbor* (1875). Among his other writings were: *The Pilgrim's Wallet* (1865); *Sermons, Speeches, and Letters on Slavery and its War* (1869); *Life of Father Taylor, the Sailor Preacher* (1871); *Christus Consolator* (1893), edited by his son.

Consult W. H. Daniels, *Memorials of Gilbert Haven* (Boston, 1880), and George Prentice, *The Life of Gilbert Haven* (New York, 1883).

HAVEN, Joseph (1816–74). An American Congregational clergyman. He was born in Dennis, Mass., graduated at Amherst in 1835, studied theology at Union Theological Seminary, and graduated at Andover in 1839. He held pastorates at Ashland and Brookline, Mass., from 1846 to 1850, edited the *Congregationalist,* was professor of mental and moral philosophy at Amherst (1850–58), and from 1858 until 1870 professor of systematic theology at Chicago Theological Seminary. In 1873 he became acting professor of mental and moral philosophy at the University of Chicago. He published: *Mental Philosophy* (1857); *Moral Philosophy* (1859); *Studies in Philosophy and Theology* (1869); *Systematic Divinity* (1875); *History of Philosophy* (1876).

HAVERCAMP, hä′vẽr-kämp, Siegbert (1684–1742). A Dutch numismatist and scholar, born and educated at Utrecht. He was long a preacher and an instructor in Greek at Leyden and was appointed professor of Greek and later of history in the same university. He edited Josephus (1726), Lucretius (1725), and other works; wrote on the history of Holland (1739) and composed a universal history to the time of Charlemagne (1736–39); but is best known for his numismatical writings: *De Numismate Alexandri Magni* (1722); *Thesaurus Morellianus* (1734); *Nummophylasium Reginæ Christinæ* (1742). Consult Sandys, *A History of Classical Scholarship,* vol. ii (Cambridge, 1908).

HAV′ERFIELD, Francis John (1860–). An English historian, born in Shipston-on-Stour and educated at Winchester and at New College, Oxford. He was a schoolmaster in 1884–91, held various posts (tutor, librarian, etc.) in Christ Church, Oxford, between 1891 and 1907, and then became Camden professor of ancient history at Oxford. His special field is the history of the western outskirts of the Roman Empire. He wrote *The Romanization of Roman Britain* (1906; new ed., 1912) and *Ancient Town Planning* (1913). He edited Henry Nettleship's *Lectures and Essays* (1895), with a memoir, and H. F. Pelham's posthumous essays (1911).

HAVERFORD COLLEGE. An educational institution, situated at Haverford, Pa. It was opened in 1833 as a school designed to afford literary instruction and religious training to the children of Friends, under whose control the present college continues. Systematic physical training and athletic sports were made prominent in the original plan. The school was temporarily suspended in 1845, to give opportunity for collecting an endowment, was reopened in 1848 and chartered as a college in 1856, open to all denominations on equal terms. In 1914 the faculty numbered 22 and the student body 176. At the same time the library contained 62,000 volumes. The college grounds, occupying 225 acres, are valued at $1,200,000, the buildings are valued at $100,000, while the endowments represent $1,100,000. The degrees of B.A., B.S., and M.A. are conferred. The president in 1914 was Isaac Sharpless, Sc.D., LL.D.

HAVERFORDWEST, hăv′ẽr-fôrd-wĕst′ *or* här′fẽrd- (Welsh *Hwlffordd*). A seaport, market town, and municipal county, the capital of Pembrokeshire, Wales, on St. George's Channel, 8 miles northeast of Milford (Map: England, A 5). It has coal mines and a paper mill. There is a small and steadily declining trade in exporting coal, cattle, and agricultural produce, and importing timber, spirits, tea, etc. Its port admits vessels of 150 tons. It has an interesting old church, the remains of a castle built about 1140 and of a twelfth-century Augustinian priory endowed by Robert de Hwlffordd. The town was colonized with Flemings by Henry I in 1107 and has a long roll of charters embodying peculiar privileges. It owns its gas and water works, markets, and slaughterhouses. Four miles from the town stands Picton Castle, a fine example of a Norman fortress. Pop., 1911, 5919.

HAV'ERGAL, Frances Ridley (1836–79). An English religious writer. She was born at Astley, England, where her father, William Henry Havergal (1793–1870), was rector. She was educated partly at home and partly at Düsseldorf, Germany. She early developed considerable musical talent and wrote hymns for which she furnished the harmonies. These gradually found their way into print, and she became known, almost against her will, because of her simple expression of deep religious devotion. Her works, in both verse and prose, include: *The Ministry of Song* (1870); *Kept for the Master's Use* (1879); *Loyal Responses* (1878); *Coming to the King* (1886); *Red-Letter Days* (1879). She is best known as author of the hymn "Take my Life and Let it Be." Her *Poetical Works* (2 vols., 1884), containing her hymns, her best work, were collected by her sister, who also published *Memorials of Frances Ridley Havergal* (2d ed., New York, 1880).

HAVERHILL, hā'vẽr-ĭl. A city in Essex Co., Mass., 33 miles north of Boston, at the head of navigation on the Merrimac River, and on the Boston and Maine Railroad (Map: Massachusetts, E 1). The city, which includes several villages, is handsomely built on hills sloping to the river, and is connected by iron bridges with the towns of Groveland and West Newbury. Haverhill is noted as an industrial centre, particularly for the manufacture of boots and shoes, the annual output being valued at $27,000,000. Other products are slippers, woolen hats, paper, boot and shoe machinery and supplies, woolens, leather, boxes, nails, and bricks. Among the principal buildings are the city hall, public library, $400,000 high school, Moose, Hibernian, and Elks homes, Masonic Temple and other society halls, old ladies' home, Hale, tuberculosis, and city hospitals, city almshouse, and Bradford Academy. There is also a marble soldiers' monument, and one to Hannah Dustan. Haverhill adopted the commission form of government as early as 1908. The executive power is vested in a mayor and four aldermen, each of whom is at the head of a city department. These officials all serve for two years. The school board, consisting of four members, are chosen at large. The charter of 1908 also provides for the initiative, referendum, and recall. The annual income and expenditures of the city in 1912 amounted to $2,807,000 and $2,783,000 respectively, the principal items of expense being $48,000 for the police department, $56,000 for the fire department, and $243,000 for education. Pop., 1890, 27,412; 1900, 37,175; 1910, 44,115; 1914 (U. S. est.), 47,071.

In 1640 a company from Ipswich and Newbury settled on the site of the Old Indian town Pentucket, and in the following year adopted the name "Haverhill" (from Haverhill, England, the birthplace of their minister, John Ward). Being a frontier town, Haverhill was continually harassed by the Indians. In the attack of 1697 Mrs. Dustan was captured. (See Dustan, Hannah.) In 1708 the French and Indians entered the town and killed 16 and captured 35 of the inhabitants. In 1645 a town charter was secured, and in 1870 Haverhill was incorporated as a city. The town of Bradford was annexed in 1897. In 1882 there was a disastrous fire. Lake Kenoza, 1 mile northeast, is famous as the birthplace of Whittier. Consult Chase, *The History of Haverhill* (Haverhill, 1861), and Frankle (ed.), *The Story of a New England Town* (Boston, 1891).

HAVERHILL. A town and summer resort, including six villages, the county seat of Grafton Co., N. H., 93 miles by rail north-northwest of Concord, on the Boston and Maine Railroad, and on the Connecticut River (Map: New Hampshire, E 4). Woodsville, the most important of the villages, has railway shops, and the town has extensive whitestone-quarrying and dairying interests and manufactures lumber, farm wagons, house finishings, stanchions, whetstones, etc. There are high-school, county, almshouse, and hospital buildings. Haverhill was first settled in 1762. Pop., 1900, 3414; 1910, 3498. Consult J. Q. Bittinger, *History of Haverhill* (Albany, 1888).

HA'VERS, Clopton (c.1650–1702). An English anatomist and physician. He studied at Cambridge and Utrecht, and from the latter college obtained the degree of M.D. in 1685. Havers began practice in London, and gave special attention to the subject of anatomy, embodying his ideas in the *Osteologia Nova* (1691). This was the first exhaustive treatise on the structure of bone, and served to perpetuate the author's name by the term "Haversian canals." He also wrote a *Survey of the Microcosme* (1695) and a *Discourse of the Concoction of the Food* (1699).

HAV'ERSACK (Fr. *havresac*, from Ger. *Habersack*, *Hafersack*, haversack, sack for oats, from *Haber*, *Hafer*, oats + *Sack*, sack). A canvas or strong duck cloth bag, carried by soldiers on the march. It is a part of the man's equipment, and on service contains the rations for immediate consumption and the individual mess kit. It was formerly worn on the left side, secured by a strap passing over the right shoulder. In the present infantry equipment, United States army, the haversack is carried on the back and is the upper element of the pack.

HAVERSCHMIDT, hä'vẽr-shmĭt, François (1835–94). A Dutch poet, born at Leeuwarden. He studied for the Church at Leyden, and undertook two small charges in 1859. Three years afterward he went to Nieuwediep, and in 1864 to Schiedam. There he published some prose essays, *Familie en Kennissen* (1876); but he is better known as "Piet Paaltjens," under which name he published all the poems written after his early youth—especially for his very popular *Snikken en Grimlachjes* (1867), student verse of which six editions were called for in two years. This was also translated into French and Latin.

HAVER'SIAN CANALS. See Bone.

HAV'ERSTRAW. A village in Rockland Co., N. Y., 32 miles north of New York City. It is picturesquely situated on the west shore of the

Hudson River, which here expands into Haverstraw Bay, and on the New Jersey and New York, the New York, Ontario, and Western, and the West Shore railroads (Map: New York, A 2). It is principally engaged in brickmaking and silk weaving, and has a public library, hospital for crippled children, and Stony Point Park. The village is governed under a general State act, the administration being vested in a president and a council chosen at the annual charter election. Pop., 1900, 5935; 1910, 5669. Haverstraw was settled by the Dutch, became a precinct in 1719, and was incorporated as a village in 1854. At the house of Thomas H. Smith, since called the "Old Treason House," Arnold met André in September, 1780, to arrange for the surrender of Stony Point. In 1825 the "Haverstraw Community" was organized here, but broke up in a few years. Consult an article, "Smith House at Haverstraw," in *Magazine of American History*, vol. v (New York, 1881).

HAVET, ȧ'vȧ', ERNEST AUGUSTE EUGÈNE (1813–89). A French philosopher, born in Paris. After some educational appointments of minor importance, he was on the staff of the Normal School (1842–53), and became also professor of French literature at the Collège de France (1854–85) and member of the Academy of Moral and Political Sciences. His best works are an edition of Pascal's *Pensées*, with commentary (1852; 2d ed., 1881), and *Le christianisme et ses origines* (4 vols., 1871–84).

HAVET, JULIEN (1853–93). A French historian, son of the philosopher, Ernest Havet. He was born at Vitry-sur-Seine, was educated in Paris at the Ecole des Chartes and the Ecoles des Hautes Etudes, and became assistant curator in the department of printed books in the Bibliothèque Nationale. Although he died in his forty-first year he accomplished a great deal in the difficult field of French history in the Merovingian and Carolingian periods. In 1889 he edited Gerbert's letters. In 1896 most of his published work was collected in *Questions mérovingiennes*, and his unpublished work in *Opuscules inédits*. Consult the bibliography in *Mélanges Havet* (Paris, 1895); Delisle's eulogy in that volume; and the sketch by his brother, Louis, an eminent Latinist, prefixed to *Questions mérovingiennes* (ib., 1896).

HAV'ILAH. A country in Arabia. It is mentioned in Gen. ii. 11–12 as surrounded by the river Pishon and containing gold, *bedolach*, and *shoham* stone; in Gen. x. 29 (1 Chron. i. 23), as one of the districts of Joktan; in Gen. x. 7 (1 Chron. i. 9), as one of the tribes of Cush; in Gen. xxv. 18, as bordering on the territory of the Ishmaelites; and in 1 Sam. xv. 7, where, however, the name should probably be emended into Telam. Niebuhr found a district called Huwaila between the seats of the Beni Khalid and Oman on the Persian Gulf. In South Arabian inscriptions a Khaulan is mentioned. The products of this country referred to in Gen. ii. 11, gold, the gum of the *bedolach* tree, and the *shoham* stone, which is the Assyrian *samtu*, or malachite, seem to point to Jemama and northeast Arabia extending to the Persian Gulf. Consult: Glaser, *Skizze der Geschichte und Geographie Arabiens* (Berlin, 1890); Meyer, *Geschichte des Alterthums*, vol. i (3d ed., Stuttgart, 1913); and the commentaries on Genesis by Dillmann (Leipzig, 1892) and Gunkel (2d ed., Göttingen, 1910).

HAV'ILAND, WILLIAM (1718–84). An English soldier in the French and Indian War in America. He was born in Ireland, and in 1739 was appointed ensign in an infantry regiment, with which he is believed to have served at Porto Bello and Cartagena. During part of the rebellion of 1745 he was aid-de-camp to Colonel (afterward Lord) Blakeney, and subsequently returned to Ireland, where he remained until 1752, when he was appointed a lieutenant colonel. In 1757 he went to America with a regiment, was in command at Fort Edward during the winter of 1757–58, served under Abercromby at Ticonderoga, and later under Amherst. In 1760 he was put at the head of a mixed force of colonists and Indians, 3400 strong, and ordered to force a way by Lake Champlain, defended by a French post at Isle aux Noix, and to join the armies of General Murray and Lord Amherst, which were converging on Montreal. He was entirely successful. After the capitulation of Montreal he served in the West Indies, and was present at the conquest of Havana in 1762. An energetic and resourceful officer, he was advanced in rank until he was made general in 1783.

HAV'ILDAR' (Hind. *havāldār*, from Hind., Pers. *havālah*, Ar. *havālat*, charge, custody + Pers. *dār*, possessing). The highest noncommissioned rank in the native army of British India.

HAVIN, ȧ'văɴ', LÉONOR JOSEPH (1799–1868). A French politician, born in Paris. He studied law, became justice of the peace at Saint-Lô (1830), and for the following 17 years was deputy from the Department of La Manche. While in the chamber he was always a member of the opposition. He was a prime mover in the agitation which led to the February revolution, but allied himself with the Moderates in the National Assembly of 1848–49. He continued to take a prominent part in the Republican government up to 1851, but after the coup d'état he lost his position in the State Council, and his influence was henceforth exerted through his journal, *Le Siècle*, which became noted for good judgment and loyalty to liberal principles.

HAVLÍČEK, hȧv'lē̂-chĕk, KAREL (1821–56). An important and popular Bohemian journalist, critic, and poet, born at Borová, whence his pseudonym, "Havel Borovský." He studied at Prague, taught at Moscow, and after his return to Bohemia edited at Prague *Národní Noviny* (1848–50), which was followed by the *Slovan* (Kuttenberg, 1850–51). For his liberal articles in these journals he was imprisoned at Brixen in the Tirol (1851), where he wrote the sarcastic *Tyrolese Elegies*. He returned to Bohemia in 1855, and died at Prague in the following year. He wrote many clever epigrams, which have not all been published; a ballad, *Král Lávra;* the satiric poem, *Křest sv. Vladímira* (The Baptism of St. Vladimir, 1877); and translations from Gogol, Voltaire, and others. His collected works, *Sebrané Spisy*, contain a part of his epigrams. His biography, by his editor, Tuma, was published at Prague (1883). The greater part of his writings have been translated into German.

HAVRE, hä'vẽr; Fr. **LE HAVRE**, lẽ ä'vr'. A city and seaport of France, capital of an arrondissement of the same name in the Department of Seine-Inférieure, on the estuary of the Seine, 142 miles by rail northwest of Paris (Map: France, N., F 3). It is a well-built and regularly laid out city, with a number of fine boulevards and squares, as the Boulevard François I, Boulevard de Strasbourg, Course de la République, and Rue de Paris, the chief boulevards occupying the site of the ancient ramparts. The most prominent public buildings are the city hall, built in Renaissance style; the church of Notre Dame, dating from the sixteenth century; the exchange, the Palais de Justice, arsenal, and customhouse. The museum has fine statues of Bernardin de Saint-Pierre and Casimir Delavigne (both natives of Havre), and contains collections of paintings and sculptures and a library of about 50,000 volumes. The harbor, formed in part by an immense dam, is regarded as one of the best in France, and has a capacity of about 500 vessels. Its entrance, defended by two forts and a number of batteries, is barely 300 feet in width. The harbor is divided into 10 separate basins, with an aggregate area of 240 acres, and has over eight miles of quays.

Havre ranks as the second seaport of France, Marseilles being first. Its situation at the mouth of the Seine gives it great advantage in regard to the internal trade of the country, while its position on the English Channel makes it one of the chief centres of the foreign trade. There is regular steam communication with New York and many other of the principal ports of the world. In 1911 the total of vessels entered and cleared was 13,362, of 10,239,000 tons. In 1911 the value of the imports and exports was 2,020,200,000 francs. This represents the special trade; the general trade amounted to 2,714,500,000 francs. The chief articles of import are cotton and cotton goods, grain, hides and skins, silk, coffee, etc. The exports are mainly silk and cotton goods, coffee, clothing, metal articles, and artificial flowers. Havre has a number of large industrial establishments, including sugar refineries, chemical and glass works, breweries, shipbuilding yards (for battleships as well as merchant vessels), electrical works, and works for the manufacture of guns and heavy ordnance. In 1856, Havre had 62,470 inhabitants; in 1896, 119,470; in 1901, 130,196; in 1906, 132,430; in 1911, 136,159.

Havre was an unimportant fishing village until 1517, when the construction of its harbor was begun by Francis I, from whom it received numerous privileges. It was surrendered to the English by the Huguenots in 1562, but was retaken by the French soon afterward. It was bombarded by the English in 1694, 1759, 1794, and 1795. Havre owes its harbor improvements to Richelieu, Louis XIV (who employed Vauban), Louis XVI, and Napoleon. In October, 1914, Belgium, having been overrun by the invading Germans, transferred its seat of government to Havre. See WAR IN EUROPE.

HAVRE. A city and the county seat of Hill Co., Mont., 80 miles northeast of Fort Benton, on the Great Northern Railroad (Map: Montana, G 1). It has extensive shops of the Great Northern System, and is situated in a coal-mining, stock-raising, and farming country. The water works are owned by the city. Pop., 1900, 1033; 1910, 3624.

HAVRE DE GRACE, hăv′ẽr de gräs. A city in Harford Co., Md., 36 miles northeast of Baltimore, on the Susquehanna River, near its mouth, in Chesapeake Bay, and on the Baltimore and Ohio and the Philadelphia, Baltimore, and Washington railroads (Map: Maryland, G 1). It has direct water connection with Baltimore, and contains a public library, hospital, and a park. The chief industrial establishments are shad and herring fisheries, flour, textile, saw, and planing mills, launch and boat yards, three large stone quarries, and fruit canneries. On Battery Island is a government fish hatchery. Pop., 1900, 3423; 1910, 4212.

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